ASSOCIATION OF MANITOBA MUNICIPALITIES
MANITOBA MUNICIPAL ENERGY, WATER AND WASTE
WATER EFFICIENCY PROJECT
TOWN OF BIRTLE
FINAL REPORT
JANUARY 2006

KGS GROUP

KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.

CONSULTING ENGINEERS & PROJECT MANAGERS

KGS GROUP

KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

January 31, 2006 File No. 05-1285-01-1000.1

Association of Manitoba Municipalities
1910 Saskatchewan Avenue West
Portage la Prairie, Manitoba
R1N 0P1

RE: Municipal Energy, Water, and Wastewater
Efficiency Studies for Birtle – Final Report

Dear Mr. Tyler MacAfee:

Enclosed is the Final Report of the Manitoba Municipal Energy, Water and Wastewater Efficiency Study for the Town of Birtle with all comments incorporated.

Included with this submission are 10 hard copies of the report and 10 copies on compact disk in PDF format with searchable text functionality, as requested in the "Request for Proposal". The PDF file consists of the entire report, including the Executive Summary, Sections 1 to 19, and Appendix A to G.

We thank you for giving us the opportunity to work on this project and look forward to continuing this work with the other Municipalities.

Yours Truly,

R. B. Bodnar, P.Eng.
Senior Mechanical Engineer/ Department Head

RBB/af

STRUCTURAL ■ GEOTECHNICAL ■ ENVIRONMENTAL ■ HYDRAULICS ■ HYDROGEOLOGY ■ MUNICIPAL ■ MECHANICAL ■ ELECTRICAL
3RD FLR. – 865 WAVERLEY ST., WINNIPEG, MANITOBA, R3T 5P4 PH: (204) 896-1209 FAX: (204) 896-0754
560 SQUIER PLACE, THUNDER BAY, ONTARIO, P7B 6M2 PH: (807) 345-2233 FAX: (807) 345-3433

EXECUTIVE SUMMARY

The objective of this study was to determine energy, water, and waste water efficiency opportunities that could enable the town of Birtle to reduce operating costs, conserve resources, and reduce greenhouse gas emissions.

An energy and water audit was conducted on fifteen buildings in the Municipality of Birtle. An audit was also done on the water distribution and wastewater collection systems. Throughout the course of these audits, water, wastewater and energy efficiency opportunities were analyzed to determine the Municipality's potential for energy and water savings. The saving opportunities were separated into the following categories:

- Lighting – Replacing the interior and/or exterior lighting with more energy efficient lights and fixtures.
- Envelope – This involves measures that would reduce the heat loss through the building's windows, doors, walls, and roof.
- Motors- Replacing low efficiency motors with higher efficiency motors.
- HVAC- Improving current heating, ventilating and air conditioning systems.
- Process Equipment: Potential upgrades to ice plants and water / waste water treatment plants
- Water – Replacing high flow water fixtures with water efficient fixtures.

There were three main issues that were noted during the course of this study that limited the potential for additional energy savings:

- The buildings have little or no ventilation (ex: Community Hall)
- Some of the buildings are maintained at low operating temperatures throughout the winter (ex: Birdtail Country Museum).
- Some of the buildings are infrequently used (ex: Fire Hall, Community Hall).

Table E1 shows the energy consumption for each of the buildings for the period from August 2004 to August 2005. This year was chosen as it represents a typical year for energy and water consumption. In addition, the most recent year was selected since the conditions of the buildings throughout this time most closely resemble the buildings' current conditions. Aside from a propane powered water heater in the Community Centre, the buildings included in this audit use electricity exclusively. The "Energy Density" column in this table is the total energy consumed in the building divided by the area of the building. This is useful in comparing the energy consumption among the different buildings in Birtle. The pie chart displays the percentage of total energy density for each of the buildings. It ranges from a high of 26% for the Sewage Lift Station to a low of less than 1% for the Tourist Information Building.

Tables E2 (a) and (b) show overall energy and water saving opportunities for all fifteen buildings in the Town of Birtle. These tables include approximate product and installation prices for each measure both with and without incentives (refer to Appendix D for list of Manitoba Hydro incentives) and simple payback years. The "Simple Payback Years" column is the overall payback period and may vary for individual buildings.

From the energy saving opportunities table (Table E2 (a)) it can be seen that the total potential for energy savings in all fifteen buildings is 336,354 kWh, or 32% of the current total energy consumption.

The water saving opportunities table (Table E2 (b)) only shows percentages of savings. The reason for this is that none of the buildings audited have water meters and actual water consumption is unknown. Actual water savings in litres/year would therefore be based on rough estimates and would not be accurate. The percentages shown in this table indicate % water savings that would result from replacing the current water fixtures in all of the buildings with water efficient fixtures.

In addition to energy, water, and cost savings, other benefits have been identified:

- Reduction in CO_2 emissions resulting in reduced contribution to climate change– the percent reduction is shown at the bottom of each of the energy saving opportunity tables.
- Lowered maintenance costs – (e.g. replacing the current lights with longer lasting bulbs).
- Improved physical comfort – (e.g. reducing infiltration into buildings).
- Delayed need to increase water and wastewater treatment plant capacities.

The water and wastewater audit is presented in Section 19 of this report. From the water system audit, it was determined that Birtle's Water Treatment Plant produces an average of 420 m^3 of water per day. There are no water meters in place to measure the water consumed by the users; therefore, water losses (water produced – water consumed) could not be determined. Water losses are due to either leakage in the system, inaccurate water meters, water main breaks or water main flushing. Reducing the water losses will reduce chemical costs required for water treatment, reduce electrical energy consumed by the pumps, and extend the life of the facility. It is recommended that water meters be installed at all service connections along the distribution system to monitor water consumption and water losses.

The sewer system in Birtle pumps the Town's wastewater from the lift station to a two-cell lagoon. Insufficient data was available to provide a detailed assessment of the sewer system; however, based on estimates of flow through the system on a dry day and flow through the system on a wet day, it was determined that the sewer system must be experiencing significant infiltration. Reducing this infiltration will reduce pumping costs and extend the life of the lagoon. For this reason, it is recommended that the Town take measures to reduce the amount of infiltration into the system. This can be done by: sealing manholes; lining pipes; and disconnecting rain leaders, sump pumps, and weeping tiles from the sanitary sewer system.

Table E1: Energy Consumption for the Period from August 2004 – August 2005

Site	Energy Density (kWh/m^2)	Area (m^2)	Electricity	
			kWh	Cost
Birtle District Community Centre	137	2845	391,166	$21,681
Birtle Community Hall	175	418	72,960	$5,139
Birtle Curling Club	130	975	126,864	$6,886
Fire Hall	96	446	43,020	$3,104
Sewage Lift Station & Generator Building	2138	25	53,640	$3,917
Resource Centre CDD and Municipal Office	164	437	71,600	$5,035
Municipal Garage	306	171	52,240	$3,720
Birdtail Country Museum	103	325	33,540	$2,421
Recycling Depot	460	18	8,200	$801
Tourist Information Building	34	137	4,690	$537
Water Treatment Plant	1609	79	126,740	$8,594
Reservoir Buildings	1612	34	54,060	$3,939
North Hill Booster Station	1193	20	23,860	$1,908
South Hill Booster Station	220	20	4,400	$494
Total			1,066,980	$68,175

Percentage of Total Energy Density for Buildings in Birtle

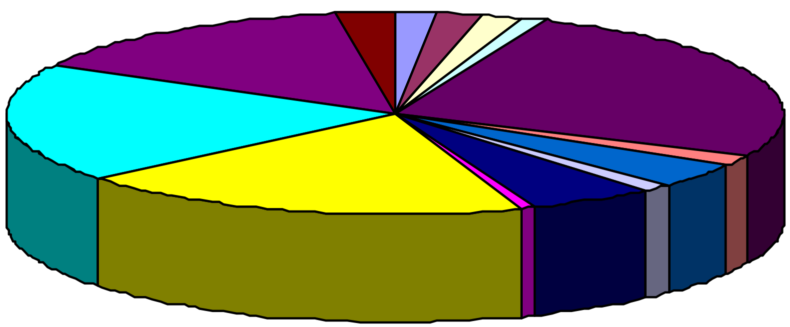


Table E2 (a): Summary of Energy Saving Opportunities for all 15 Buildings in Birtle **Page 1 of 3**

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years***		Related Buildings
		Capital		Labour							
		NI*	WI*		NI*	WI*	kWh	$	NI*	WI*	
LIGHTING											
Replace EXIT incandescent lamps with LED modules.	24	$50	$5	$80	$3,557	$2,326	5,676	$341	10.4	6.8	Arena, Community Hall, Curling Club, and Resource Centre.
Replace exterior incandescent lamps with high-pressure sodium lights.	17	$130	$93	$130	$5,039	$4,312	4,459	$268	18.8	16.1	Arena, Community Hall, Curling Club, Sewage Lift Station, Resource Centre, Garage, and Recylcing Depot.
When replacing interior incandescents, replace them with compact fluorescents.	10	$13	$8	$0	$148	$91	670	$40	3.7	2.3	Recycling Depot, Reservoir, and North and South Hill Booster Stations.
Replace interior incandescent lamps with compact fluorescents.	50	$15	$10	$13	$1,568	$1,283	4,922	$296	5.3	4.3	Arena, Museum, Curling Club, Tourist Information, and Water Treatment Plant.
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	152	$75	$40	$75	$25,992	$19,927	15,981	$960	27.1	20.8	Arena, Community Hall, Curling Club, Fire Hall, Garage, Museum, and Water Treatment Plant.
Retrofit 8'x1 T12 fluorescents with T8 ballast and tubes.	19	$65	$30	$65	$2,816	$2,058	2,120	$127	22.1	16.2	Arena.
Retrofit 4'x4 T12 fluorescents with T8 ballast and tubes.	24	$60	$40	$65	$3,420	$2,873	472	$28	120.7	101.4	Community Hall.
Retrofit 4'x2 T12 fluorescents with T8 ballast and tubes.	28	$55	$35	$60	$3,671	$3,032	798	$48	76.7	63.3	Curling Club, Fire Hall, and Garage.
Install parking lot controllers.	5	$100	$75	$150	$1,425	$1,283	1,800	$108	13.2	11.9	Resource Centre.
Lighting Subtotal					**$47,635**	**$37,184**	**36,898**	**$2,215**			
ENVELOPE											
Replace and weather-strip doors.	11	$350	$350	$100	$5,643	$5,643	17,381	$1,044	5.4	5.4	Community Hall, Curling Club, Sewage Lift Station, and Museum.
Replace and weather-strip vehicle doors.	1	$1,000	$1,000	$400	$1,596	$1,596	7,496	$450	3.5	3.5	Arena.
Weather-strip doors.	28	$15	$15	$50	$2,075	$2,075	50,691	$3,043	0.7	0.7	Arena, Community Hall, Curling Club, Fire Hall, Sewage Lift Station, Resource Centre, Garage, Water Treatment Plant, Reservoir, and North and South Booster Stations.

Table E2 (a): Summary of Energy Saving Opportunities for all 15 Buildings in Birtle **Page 2 of 3**

Description	Qty	Installed Cost/Unit ($) Capital NI*	Installed Cost/Unit ($) Capital WI*	Installed Cost/Unit ($) Labour	Total Cost** ($) NI*	Total Cost** ($) WI*	Estimated Annual Savings kWh	Estimated Annual Savings $	Simple Payback Years*** NI*	Simple Payback Years*** WI*	Related Buildings
Replace windows.	16	$11,818	$8,976	$2,000	$15,753	$12,513	10,976	$659	23.9	19.0	Curling Club, Resource Centre, and Museum.
Seal windows.	18	$5	$5	$25	$616	$616	7,836	$470	1.3	1.3	Resource Centre, Museum, and Water Treatment Plant.
Add R20 insultation to the exterior walls.	1	$25,670	$21,180	$25,670	$58,528	$53,409	35,775	$2,148	27.2	24.9	Arena, Sewage Lift Station, Museum, Water Treatment Plant, Reservoir, and North and South Hill Booster Station.
Replace Recycling depot Building.	1	$9,000	$9,000	$9,000	$20,520	$20,520	3,816	$229	89.6	89.6	Recycling Depot.
Envelope Subtotal					**$104,730**	**$96,371**	**133,971**	**$8,044**			
HVAC											
Install programmable thermostat; setback temperature to 15 ^{o}C (59 ^{o}F).	14	$300	$300	$300	$9,576	$9,576	28,085	$1,686	5.7	5.7	Arena, Community Hall, Curling Club, Fire Hall, Resource Centre, and Garage.
Reduce temperature setting in building.	NA	$0	$0	$0	$0	$0	16,458	$988	0.0	0.0	Sewage Lift Station and Water Treatment Plant.
Install motorized dampers.	9	2,000	2,000	1,900	$4,446	$4,446	48,514	$2,913	1.5	1.5	Arena, Curling Club, Sewage Lift Station, Resource Centre, Garage, Water Treatment Plant, and Fire Hall.
Provide vehicle emissions monitoring control of ventilation systems.	2	$850	$850	$200	$2,394	$2,394	19,896	$1,195	2.0	2.0	Garage and Fire Hall.
Install geothermal heat pump.	1	$14,250	$8,750	$14,250	$32,490	$26,220	27,546	$1,654	19.6	15.9	Resource Centre.
HVAC Subtototal					**$48,906**	**$42,636**	**140,501**	**$8,436**			
MOTORS											
When replacing 7.5 HP motors, replace them with premium efficiency motors.	4	$100	$100	$0	$456	$456	1,721	$103	4.4	4.4	Curling Club, Reservoir, and North Hill Booster Station.

Table E2 (a): Summary of Energy Saving Opportunities for all 15 Buildings in Birtle **Page 3 of 3**

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years***		Related Buildings
		Capital		Labour							
		NI*	WI*		NI*	WI*	kWh	$	NI*	WI*	
When replacing 20 HP motors, replace them with premium efficiency motors.	1	$200	$200	$0	$228	$228	1,031	$62	3.7	3.7	Arena.
When replacing 25 HP motors, replace them with premium efficiency motors.	2	$300	$300	$0	$684	$684	1,358	$82	8.4	8.4	Curling Club.
When replacing 75 HP motors, replace them with premium efficiency motors.	2	$1,250	$1,250	$0	$2,850	$2,850	3,493	$210	13.6	13.6	Arena.
Motors Subtotal					**$4,218**	**$4,218**	**7,603**	**$456**			
HOT WATER											
Install water efficient metering faucets.	18	$309	$309	$150	$9,419	$9,419	4,323	$260	36.3	36.3	Arena, Community Hall, Curling Club, Fire Hall, Resource Centre, Garage, and Museum.
Install water efficient showerheads.	5	$21	$21	$50	$405	$405	2,143	$129	3.1	3.1	Arena and Fire Hall.
Fix leaking shower.	1	$242	$242	$150	$447	$447	8,122	$488	0.9	0.9	Arena.
Replace water heater with instantaneous water heater.	2	$300	$300	$900	$2,736	$2,736	2,327	$140	19.6	19.6	Garage and Water Treatment Plant.
Insulate hot water piping.	1	$50	$50	$50	$114	$114	465	$28	4.1	4.1	Arena.
Water Subtotal					**$13,120**	**$13,120**	**17,381**	**$1,044**			

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Production	1,066,980	$68,175	31.8
Estimated Annual Savings	336,354	$20,195	10.0
Percent Savings	32%	30%	31%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes.
*** This is the overall payback period and may vary for individual buildings (refer to tables throughout report for payback years for a specific building).

Table E2 (b) Summary of Water Saving Opportunities for the Town of Birtle

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Related Buildings
		Capital	Labour			
Install water efficient metering faucets.	19	$309	$150	$9,942	80%	Arena, Community Hall, Curling Club, Fire Hall, Resource Centre, Museum, Garage, and Tourist Information.
Install water efficient toilets.	23	$284	$150	$11,379	55%	Arena, Community Hall, Curling Club, Fire Hall, Resource Centre, Museum, Garage, and Tourist Information.
Install water efficient showerheads.	6	$21	$50	$486	29%	Arena, Fire Hall, and Resource Centre.
Replace leaking showerhead and valve.	1	$242	$150	$447	100%	Arena.
Replace urinals with low flow urinals	5	$344	$200	$3,101	65%	Arena, Community Hall, and Fire Hall.

The total cost column includes 14% taxes.

MMEP AUDITORS

Energy Audit:
Ray Bodnar
KGS Group
865 Waverley Street
Winnipeg, Manitoba, R3T 5P4
Phone: (204) 896-1209
Fax: (204) 896-0754
Email: Rbodnar@kgsgroup.com

Water and Wastewater Audit:
Tibor Takach
KGS Group
Suite 310-2365 Albert Street
Regina, Saskatchewan, S4P 4K1
Phone: (306) 545-1777
Fax: (306) 545-1829
Email: Ttakach@kgsgroup.com

MMEP PARTNERS

Association of Manitoba Municipalities
Manitoba Hydro
Manitoba Conservation
Agriculture and Agri-Food Canada - Prairie Farm Rehabilitation Administration
Manitoba Culture, Heritage, and Tourism

FUNDING

Federation of Canadian Municipalities/Green Municipal Fund
Sustainable Development Innovations Fund

This Study has been produced with the assistance of the Green Municipal Enabling Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the author(s), and the Government of Canada and the Federation of Canadian Municipalities accept no responsibility for them.

Additional support for the MMEP Project provided by Manitoba Conservation, Sustainable Development Innovations Fund.

ACKNOWLEDGEMENTS

KGS Group and the MMEP partners gratefully acknowledge the valuable contributions the following people have made in providing their time, helpful suggestions, and participation in this energy and water efficiency project:

- Joan Taylor, Chief Administrative Officer
- Eleanor Dnistransky, Economic Development Officer (Municipal Office)
- Jim Vinnie (Community Centre)
- Andy Brydon (Community Hall)
- Brian Salmon (Fire Hall and Municipal Garage)
- Charlene Smith (Birdtail Museum)
- Staff at the Birtle Town Office

COPYRIGHT

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

PAGE

TABLE OF CONTENTS
(Continued)

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 BACKGROUND

Energy and water conservation is becoming more important as environmental concerns grow and energy costs increase. For this reason it is important to perform energy, water and wastewater efficiency audits to identify practical efficiency improvement opportunities and determine the capital costs and payback periods associated with these implementations.

An energy and water efficiency audit was conducted on fifteen buildings in the Municipality of Birtle to determine how these buildings could reduce both energy and water consumption. In addition, the water distribution and wastewater collection systems were audited to determine what opportunities exist for improving the systems efficiencies.

1.2 OBJECTIVE

The objective of this study was to determine energy, water, and waste water efficiency opportunities that could enable the Town of Birtle to reduce operating costs, conserve resources, and reduce greenhouse gas emissions. All 15 buildings in the Town of Birtle were analyzed separately and the results are presented in separate sections throughout this report. The water and wastewater systems are discussed in Section 19.

1.3 METHODOLOGY

The buildings were toured on September 15 and 16, 2005 by Mr. Ray Bodnar, P.Eng. and Mr. Tibor Takach, P.Eng., both of KGS Group Engineering Consultants. These tours involved a walkthrough of each of the buildings to determine the current condition of the building's envelope (walls, roof, windows, and doors), lighting, water fixtures, heating, ventilation and air conditioning (HVAC) systems, and motors.

During the building tours, the auditors met with the Town of Birtle's Chief Administrative Officer Joan Taylor to discuss the study objectives for identifying energy, water, and wastewater saving opportunities, and to provide information on existing incentive programs. At this time, it was determined that there are currently no new building or retrofit projects underway for the town.

While auditing the buildings, whenever possible, on-site training was done to inform the staff on energy and/or water saving opportunities in specific buildings and to point out maintenance issues where applicable.

Using the information collected during the audit, available drawings of the buildings, historical weather data, and the hydro bills from the past 12 months, calculations were performed to determine how each of the buildings are consuming energy and water. Several assumptions were made throughout these calculations including occupancies, room temperatures, and envelope conditions (see Inventory Sheets in Appendix A). When no drawings were available, wall/roof R-values were assumed based on discussions with site personnel or based on knowledge of other buildings of similar type/age to the building surveyed.

Energy Saving Opportunities (ESOs) were developed for each building and are presented in tables throughout this report showing energy savings, cost savings, installation costs, and simple payback periods. Simple Payback periods are calculated as the total installation cost divided by the annual cost savings. The installation costs include the capital costs, both with and without incentives (see Appendix D for list of Manitoba Hydro incentives), and the labour costs for the installation using standard contractor rates. The total energy savings, the percent energy savings, and the associated costs are presented at the end of each ESO table. It should be noted that the energy savings and capital cost estimates are preliminary. For complex measures such as geothermal heating / cooling, a more detailed investigation would be required to confirm capital and installation costs for this system.

An environmental benefit that results from reducing energy consumption is a reduction in CO_2 emissions. CO_2 is a greenhouse gas and thus contributes to global warming. Although over 95% of Manitoba's electricity is produced by hydropower and thus emits very little CO_2, some of the electrical generating stations in Canada and the United States burn fossil fuels and emit large quantities of CO_2 into the atmosphere. By reducing the electrical energy consumption here in Manitoba, more of Manitoba Hydro's clean hydropower is available for offsetting the fossil-fuelled electrical generating stations. At the bottom of each ESO table, the total CO_2 reduction resulting from the energy savings is shown. This was calculated using a CO_2 emissions calculator produced by Natural Resources Canada.

Many of the ESOs have low installed costs and payback periods of less than two years. Once the implementation phase begins, these ESOs are the most attractive measures. However, in order to maximize long-term savings and efficiencies for the buildings, implementation of the more capital-intensive measures with the longer payback periods is necessary. These items will become more attractive as energy costs increase in the future. It is recommended that the savings associated with the short payback ESOs be reinvested annually as a means to help finance the more expensive options.

Water Saving Opportunities (WSOs) are also presented in this report. The WSOs include installing water efficient sinks, toilets, urinals, and showers. Since none of the buildings have water meters, the savings are shown as percentages of the current fixtures water consumption.

The water and wastewater systems in the Town of Birtle were analyzed and are discussed in Section 19 of this report. In addition to an overview of the water and wastewater sytems, several recommendations are made to help the Town monitor water consumption and losses and reduce operating costs.

2.0 COMMUNITY CENTRE (ARENA)

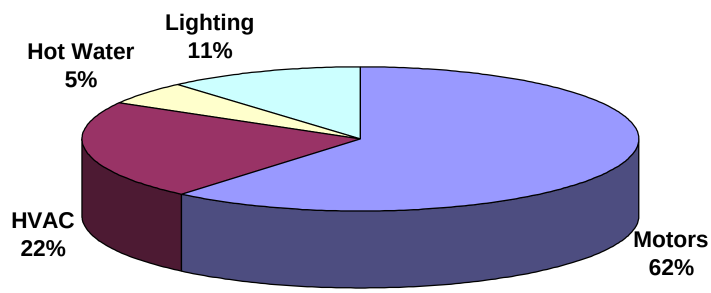
2.1 BACKGROUND

The Birtle Community Centre is a 30,625 square foot metal frame structure with metal cladding on both the inside and outside walls separated by 10" of insulation. The Community Centre was constructed in 1975-1976 and houses a skating rink, a reception area, and change rooms in the basement. This building is occupied regularly in the winter months (October to March) while in the summer it is occupied approximately once a month for special events.

Photo 1 - Community Centre

The Community Centre uses mostly electricity with a total consumption for the previous year of 391,000 kWh at a cost of $21,700. Almost a quarter of the cost of electricity comes from high levels of demand between the months of November and April; this can be seen in Table B.1.2 in Appendix B. The largest portion of electricity is consumed by the motors for the ice plant, as can be seen in the pie chart below. However, heating the building also consumes a significant portion of the electricity.

Energy Breakdown (% of Total kWh) for the Community Centre (Arena)



The hot water used to flood the rink is heated with a propane heater. Since no information was obtained on propane consumption, the pie chart above does not include the energy consumption of the zamboni water heater. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. A total annual hot water consumption was then established.

There are two washrooms in this building, one on the main floor and one in the basement. In addition, a large portion of the annual water consumption is used to flood the rink. There are no water meters in this facility to measure the actual water usage; however, based on the current water fixtures, calculations were made to determine the percent reduction in water consumption when replacing these fixtures with new water efficient fixtures.

2.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 1 and 2 show a summary of both the energy and water saving opportunities for the Community Centre. The following assumptions were made in determining the annual savings:

- The Centre is occupied for 10 hours per day for 6 months of the year (October to March).
- The temperature of the reception area is maintained at 21°C (70°F) and the rink area at -6°C (21°F).
- For the purpose of water consumption, the typical occupancy of the arena is taken as 50.
- The exit lamps are on 24 hours per day year round and the outdoor lights are on 12 hours per day year round.
- The 20 HP motor on the brine pump for the ice plant runs at 80% utilization.
- The 75 HP motors on the ice plant's compressor runs at 80% utilization.

Table 1 Energy Saving Opportunities for the Community Centre

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	12	$50	$5	$80	$1,778	$1,163	2,838	$170	10.4	6.8
Replace exterior incandescent lamps with high pressure sodium lights.	4	$130	$93	$130	$1,186	$1,015	1,314	$79	15.0	12.9
Retrofit 8' x 2 T12 fluorescents with T8 ballast and tubes.	24	$75	$40	$75	$4,104	$3,146	5,357	$322	12.8	9.8
Retrofit 8' x 1 T12 fluorescents with T8 ballast and tubes.	19	$65	$30	$65	$2,816	$2,058	2,120	$127	22.1	16.2
Replace interior incandescents with compact fluorescents.	6	$15	$10	$13	$188	$154	1,188	$71	2.6	2.2
Lighting Subtotal					**$10,072**	**$7,535**	**12,817**	**$770**		
ENVELOPE										
Replace and weatherstrip wood vehicle door.	1	$1,000	$1,000	$400	$1,596	$1,596	7,496	$450	3.5	3.5
Weatherstrip pedestrian doors.	8	$15	$15	$50	$593	$593	12,827	$770	0.8	0.8
Upgrade wall insulation between rink and reception.	1	$2,400	$2,000	$2,400	$5,472	$5,016	7,548	$453	12.1	11.1
Envelope Subtotal					**$7,661**	**$7,205**	**27,871**	**$1,673**		
HVAC										
Install programmable thermostat; setback temp to 15 °C (59 °F) in reception.	3	$300	$300	$300	$2,052	$2,052	6,504	$391	5.3	5.3
Install motorized damper on greasehood air intake vent.	1	$400	$400	$300	$798	$798	16,580	$995	0.8	0.8
HVAC Subtototal					**$2,850**	**$2,850**	**23,084**	**$1,386**		
MOTORS										
When current 75HP compressor motors require replacement, replace them with high efficiency motors.	2	$1,250	$1,250	$0	$2,850	$2,850	3,493	$210	13.6	13.6
When current 20HP brine pump motor requires replacement, replace it with a high efficiency motor.	1	$200	$200	$0	$228	$228	1,031	$62	3.7	3.7
Motors Subtotal					**$3,078**	**$3,078**	**4,524**	**$272**		
HOT WATER										
Install water efficient metering faucets.	4	$309	$309	$150	$2,092	$2,092	1,996	$120	17.5	17.5
Install water efficient showerheads.	3	$21	$21	$50	$244	$244	2,549	$153	1.6	1.6
Replace leaking showerhead and valve.	1	$242	$242	$150	$447	$447	7,485	$449	1.0	1.0
Insulate hot water piping.	1	$50	$50	$50	$114	$114	465	$28	4.1	4.1
Water Subtotal					**$2,897**	**$2,897**	**12,495**	**$750**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Production	391,166	$21,681	11.7
Estimated Annual Savings	80,792	$4,851	2.4
Percent Savings	21%	22%	21%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes.

Table 2 Water Saving Opportunities for the Community Centre

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	4	$309	$150	$2,093	80%
Install water efficient toilets.	4	$284	$150	$1,979	55%
Install water efficient showerheads.	3	$21	$50	$243	29%
Replace leaking shower head and valve	1	$242	$150	$447	100%
Replace auto-flush urinals with water efficient urinals.	2	$344	$200	$1,240	75%

* The total cost column includes 14% taxes.

2.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis summary for the Community Centre is shown in Appendix B, Table B.1.3. Aside from the metal halides, the fluorescent T12s consume the most electricity. Although the initial cost of replacing the T12s with T8s is high, savings of over 7,000 kWh per year would result from this upgrade. The energy consumption from the exit signs can be reduced to 10% of the current consumption by replacing the incandescent bulbs with LEDs. The most economical upgrade that can be made is to replace the interior incandescent bulbs with compact fluorescents. This upgrade would save just over 1,000 kWh per year, with a payback of less than 3 years.

Envelope

There are no exterior windows in this building and the exterior walls and roof have adequate insulation; therefore, the energy savings will be found by either replacing or weather-stripping the doors and upgrading the insulation in the walls between the reception area and the rink. Replacing the old wood vehicle door from the rink to outside with an insulated vehicle door would reduce the heat losses by over 7,000 kWh per year, with a payback of less than 4 years.

Large savings can also be found in weather-stripping the remaining doors. The current heat loss through the cracks around the door frames totals over 12,000 kWh per year; replacing the weather-stripping would reduce this heat loss with a payback of less than 1 year. Finally, upgrading the wall insulation between the rink and the reception area would save over 7,500 kWh per year. Table B.1.4 in Appendix B shows details on these calculations.

HVAC

Installing setbacks on the thermostats in the reception area could result in energy savings with a very short payback. The thermostats should be programmed such that the temperature is reduced to 15°C (59°F) when the building is unoccupied. The thermostats should be wired into the light switches such that when the building is occupied and the lights are switched on, the thermostat will set to 21°C (70°F) during occupancy.

A motorized damper in the grease hood air intake duct in the kitchen would also result in energy savings. Currently, outside air is free to flow into the building. Installing a motorized damper on the air intake vent in the kitchen would save over 16,000 kWh of energy per year.

Motors

When the compressor and brine pump motors require replacement, consideration should be given to installing premium efficiency motors. The energy savings that would result from installing premium efficiency motors over standard efficiency motors are shown in Table 1 above.

Water

Exact water savings in litres are not shown in Table 2 above; however, Table B.1.5 in Appendix B shows estimated water consumption results that were calculated based on typical water fixtures and estimations of the occupancy of the Community Centre.

One of the showers is leaking badly and should be repaired. In addition, replacing the faucets and the automatic flush urinals with water efficient fixtures would result in 80% and 75% water savings respectively. The automatic flush urinals that are currently installed in the main floor washroom consume approximately 5 gallons/flush and they flush approximately once every 20 minutes year round. Since the Community Centre is rarely used in the summer, large water savings would result if these urinals were replaced with manual flush urinals.

2.4 OPERATION AND MAINTENANCE

Based on the inspection of this facility, the following operation and maintenance activities should be performed immediately to reduce energy consumption:

- Clean ice plant condenser coils seasonally.
- Clean heating units.

Also refer to section 16 for more information.

3.0 COMMUNITY HALL

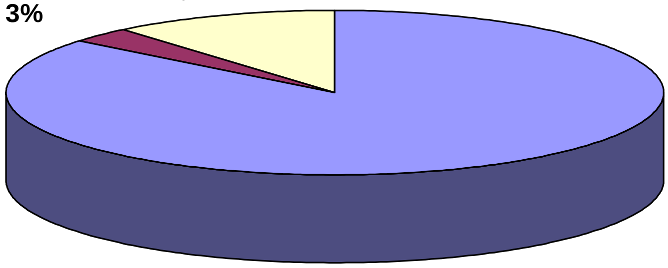
3.1 BACKGROUND

Birtle Community Hall, built in 1959, is a 4,500 square foot building constructed of concrete block and exterior metal cladding. The walls have recently been insulated with 1 ½" Styrofoam and the roof is insulated with 12" thick blow-in insulation. The hall is used for Bingo once a week (3 hours) and for approximately two socials per month (4 hours each).

Photo 2 Community Hall

The annual electricity consumption for the hall is 72,000 kWh with a total cost of just over $5,000 for the year. The pie chart below shows the portions of the total energy consumption used for lighting, water heating, and building heat. Since the hall is only occupied 3% of the time, the energy consumption for hot water and lights is quite low.

Energy Breakdown (% of Total kWh) for the Community Hall



There are two washrooms in the hall, one on the main floor and one in the basement. Due to the low occupancy of the hall, these washrooms are infrequently used. There are no water meters in this facility to measure the actual water usage; however, based on the current water fixtures, calculations were made to determine the percentage of water savings that would result from replacing these fixtures. In order to determine the energy used to heat the water, estimations were made on the frequency at which the water fixtures were used.

3.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 3 and 4 show a summary of energy and water saving opportunities for the Community Hall. The following assumptions were made in the analysis:

- The Community Hall is occupied for 252 hours per year.
- The temperature of the hall is maintained at 21°C (70°F).
- For the purpose of water consumption, the typical occupancy of the hall during an event is 150.
- The exit lamps are on 24 hours per day year round and the outdoor lights are on 12 hours per day year round.

Table 3 Energy Saving Opportunities for the Community Hall

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	6	$50	$5	$80	$889	$581	1,419	$85	10.4	6.8
Replace exterior incandescent lamps with high-pressure sodium lights.	2	$130	$93	$130	$593	$507	438	$26	22.5	19.3
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	20	$75	$40	$75	$3,420	$2,622	625	$38	91.1	69.9
Retrofit 4'x4 T12 fluorescents with T8 ballast and tubes.	24	$60	$40	$65	$3,420	$2,873	472	$28	120.7	101.4
Lighting Subtotal					**$8,322**	**$6,584**	**2,954**	**$177**		
ENVELOPE										
Replace and weatherstrip old exterior wood doors (2 singles and 1 double).	4	$350	$350	$100	$2,052	$2,052	7,794	$468	11.0	11.0
Weatherstrip front entrance doors (1 single and 1 double).	3	$15	$15	$50	$222	$222	4,673	$281	0.8	0.8
Envelope Subtotal					**$2,274**	**$2,274**	**12,468**	**$749**		
HVAC										
Install programmable thermostat; Setback temp to 15 ^{o}C (59 ^{o}F).	3	$300	$300	$300	$2,052	$2,052	6,440	$387	5.3	5.3
HVAC Subtototal					**$2,052**	**$2,052**	**6,440**	**$387**		
HOT WATER										
Install water efficient metering faucets.	4	$309	$309	$150	$2,092	$2,092	793	$48	43.9	43.9
Water Subtotal					**$2,092**	**$2,092**	**793**	**$48**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Production	72,960	$5,139	2.2
Estimated Annual Savings	22,654	$1,360	0.7
Percent Savings	31%	26%	32%

* NI = Cost does not include incentive, WI = Cost includes incentive
* *The total cost column includes 14% taxes.

Table 4 Water Saving Opportunities for Community Hall

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	4	$309	$150	$2,093	80%
Install water efficient toilets.	8	$284	$150	$3,958	55%
Install water efficient urinals.	2	$344	$200	$1,240	60%

* The total cost column includes 14% taxes.

3.3 GENERAL RECOMMENDATIONS

Lighting

From Table 3 above it can be seen that in terms of lighting, some of the energy saving opportunities are unrealistic due to the long payback period. Since the Community Hall is occupied for so few hours every year, replacing the T12s with T8s would not result in sufficient savings to make replacing them worthwhile (this assumes that the lights are turned off when the hall is not in use). Replacing the exit sign incandescent lamps with LEDs, however, would result in significant savings since they run 24 hours a day regardless of the occupancy. Similarly, the exterior incandescent lamps run 12 hours per day year round and therefore, replacing these lamps with high pressure sodium lights would result in significant savings with a short payback period. The lighting analysis summary table is shown in Appendix B as Table B.2.3.

Envelope

There are no windows in the Community Hall and the walls and roof have upgraded insulation, therefore, the only energy savings in terms of the building's envelope would result from replacing and sealing the doors. Replacing the three old wood doors to the hall and repairing the weather-stripping would save over 12,000 kWh per year, more than 15% of the current annual energy consumption. The results from these calculations are shown in Appendix B, Table B.2.4.

HVAC

Since the hall is unoccupied for 97% of the year, reducing the temperature during these times is essential. Installing setbacks on the thermostats wired to the light switches and maintaining the temperature at 15°C (59°F) as opposed to 21°C (70°F) when the building is unoccupied would save 6,400 kWh per year with a payback period of less than 6 years.

Water

The water analysis summary is shown in Table B.2.5 in Appendix B. Although the water consumption is fairly low for the Community Hall, replacing the fixtures with water efficient fixtures would save between 55 and 80% of their current water consumption.

4.0 CURLING CLUB

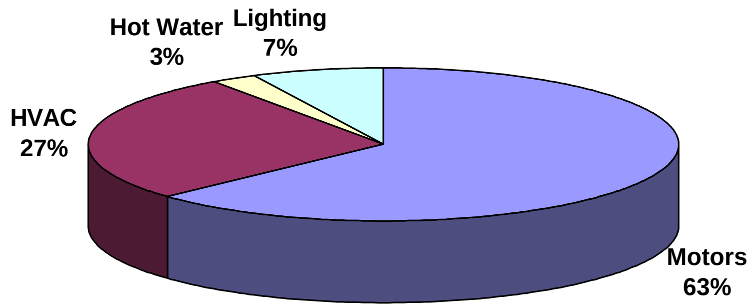
4.1 BACKGROUND

The Curling Club, built in 1970-1971, is a two-story, 10,500 square foot metal clad building with a lounge on both the main floor and upstairs overlooking the curling rink. The Curling Club is open for six months of the year with a maximum occupancy of approximately 75 people.

Photo 3 - Curling Club

The total electricity consumption for the previous year was just less than 130,000 kWh and was used for lighting, heating, motors for the ice plant, and hot water as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Curling Club



There are no water meters in this facility to measure the actual water usage in the three washrooms; therefore, calculating the energy used to heat the water involved making assumptions on the frequency at which the faucets are used.

4.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 5 and 6 show summaries of the energy and water efficiency improvement opportunities for the Curling Club. The following assumptions were made in the calculations:

- The Curling Club is occupied for 6 months of the year for 18 hours per week.
- The temperature of the curling rink is maintained at 0°C (32°F) and the lounges at 21°C (70°F).
- For the purpose of water consumption, the typical occupancy of the curling rink is 75.
- The exit lamps are on for 24 hours per day year round and the exterior lights are on 12 hours per day year round.
- The 25 HP motors for the ice plant's compressors run 80% utilization.
- The 7.5 HP motor for the ice plant's brine pump runs at 80% utilization.

Table 5 Energy Saving Opportunities for the Curling Club

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	5	$50	$5	$80	$741	$485	1,183	$71	10.4	6.8
Replace exterior incandescent lamps with high pressure sodium lights.	1	$130	$93	$130	$296	$254	219	$13	22.5	19.3
Retrofit 8' x 2 T12 fluorescents with T8 ballast and tubes.	64	$75	$40	$75	$10,944	$8,390	3,666	$220	49.7	38.1
Retrofit 4' x 2 T12 fluorescents with T8 ballast and tubes.	6	$55	$35	$60	$787	$650	108	$6	121.2	100.1
Replace interior incandescent lamps with compact fluorescents.	3	$15	$10	$13	$94	$77	103	$6	15.3	12.5
Lighting Subtotal					**$12,862**	**$9,855**	**5,279**	**$317**		
ENVELOPE										
Replace and seal windows.	12	$10,268	$7,712	$1,600	$13,530	$10,616	6,216	$373	36.3	28.4
Replace wood doors to rink.	2	$350	$350	$100	$1,026	$1,026	978	$59	17.5	17.5
Weatherstrip exterior doors.	3	$15	$15	$50	$222	$222	4,248	$255	0.9	0.9
Envelope Subtotal					**$14,778**	**$11,864**	**11,442**	**$687**		
HVAC										
Install programmable thermostat; setback temp to 15 ^{o}C (59 ^{o}F).	2	$300	$300	$300	$1,368	$1,368	2,762	$166	8.3	8.3
Install motorized dampers on intakes.	2	$300	$300	$300	$1,368	$1,368	9,955	$598	2.3	2.3
HVAC Subtototal					**$2,736**	**$2,736**	**12,717**	**$763**		
MOTORS										
When current 25HP compressor motors require replacement, replace them with high efficiency motors.	2	$300	$300	$0	$684	$684	1,358	$82	8.4	8.4
When current 7.5HP brine pump motor requires replacement, replace it with a high efficiency motor.	1	$100	$100	$0	$114	$114	619	$37	3.1	3.1
Motors Subtotal					**$798**	**$798**	**1,977**	**$119**		
HOT WATER										
Install water efficient metering faucets in sinks.	4	$309	$309	$150	$2,092	$2,092	727	$44	47.9	47.9
Water Subtotal					**$2,092**	**$2,092**	**727**	**$44**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Cost/Production	126,864	$6,886	3.8
Estimated Annual Savings	32,141	$1,930	1.0
Percent Savings	25%	28%	26%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes.

Table 6 Water Saving Opportunities for the Curling Club

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	4	$309	$150	$2,093	80%
Install water efficient toilets.	4	$284	$150	$1,979	55%

* The total cost column includes 14% taxes.

4.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis results for the Curling Club can be found in Appendix B, Table B.3.3. Replacing all the lights suggested in Table 5 above would result in total annual savings of over 5,000 kWh. Due to the large number of 8' T12s, the most significant energy savings come from replacing these T12s with T8s, however, the payback period for this upgrade is long.

Envelope

There are several large windows in both the main floor and upstairs lounges overlooking the curling rink. Replacing these windows with new, energy efficient windows could save a considerable amount of heat loss. There are also two old wood doors from the main floor to the curling rink. Replacing these doors would save approximately 1,000 kWh per year. The most economical saving opportunities are to weather-strip the three steel doors to outside. The energy savings are large with less than a year payback period. The analysis on the envelope for the Curling Club is shown in Appendix B, Table B.3.4.

HVAC

Installing thermostats in the lounges that are wired into the light switches would reduce heat losses by almost 3,000 kWh per year. When the Curling Club is unoccupied, the thermostat will maintain the temperature of the lounges at 15°C (59°F). When the lights are switched on, the thermostat will increase its setting back to 21°C (70°F).

Assuming the rink is kept at 0^oC (32^oF) throughout the winter, installing motorized dampers on the air intake vents into the rink area would save almost 10,000 kWh per year.

Water

Energy savings of 800 kWh to heat the water used in the washroom sinks and water usage savings from 55% to 80% would result from installing new water efficient sinks and toilets in the washrooms. This water analysis is shown in Appendix B, Table B.3.5.

5.0 FIRE HALL

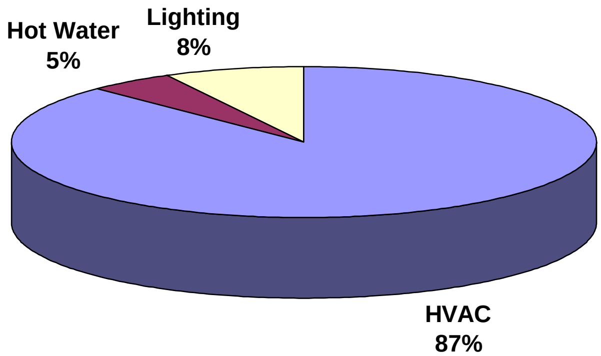
5.1 BACKGROUND

The Fire Hall is a 4,800 square foot metal frame structure with a metal liner on both the inside and outside walls separated by 6" of insulation. The building was constructed in 1995 and contains a truck bay, an office, and a washroom. The fire hall is only occupied intermittently for service and in the case of a fire/emergency situation.

Photo 4 - Fire Hall

The electricity consumption for the previous year was 43,000 kWh with a total cost of $3,100. The pie chart below shows the breakdown of energy consumption for this building.

Energy Breakdown (% of Total kWh) for the Fire Hall



The majority of the water at the Fire Hall is used to fill the fire trucks. There are also two washrooms that consume a portion of the annual water consumption. There are no water meters at this facility so assumptions were made on the frequency with which the water fixtures are used.

5.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 7 and 8 show summaries of the energy and water saving opportunities for the Fire Hall. The following assumptions were made in the calculations:

- The Fire Hall is occupied intermittently for 10 hours per week.
- The temperature of the Fire Hall is maintained at 21°C (70°F).
- For the purpose of water consumption, typical occupancy of the hall is 5.

Table 7 Energy Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	20	$75	$40	$75	$3,420	$2,622	1,290	$77	44.2	33.9
Retrofit 4'x2 T12 fluorescents with T8 ballast and tubes.	18	$55	$35	$60	$2,360	$1,949	365	$22	107.7	88.9
Lighting Subtotal					**$5,780**	**$4,571**	**1,655**	**$99**		
ENVELOPE										
Weatherstrip pedestrian doors.	2	$15	$15	$50	$148	$148	2,832	$170	0.9	0.9
Envelope Subtotal					**$148**	**$148**	**2,832**	**$170**		
HVAC										
Install programmable thermostat; setback temp to 15 °C (59 °F).	2	$300	$300	$300	$1,368	$1,368	3,740	$225	6.1	6.1
Provide vehicle emissions monitoring control of ventilation systems.	1	$850	$850	$200	$1,197	$1,197	9,948	$597	2.0	2.0
Replace exhaust fan back draft damper with motorized damper.	1	$400	$400	$400	$912	$912	8,290	$498	1.8	1.8
HVAC Subtotal					**$3,477**	**$3,477**	**21,979**	**$1,320**		
HOT WATER										
Install water efficient metering faucets.	2	$309	$309	$150	$1,047	$1,046	96	$6	181.1	181.0
Install water efficient showerheads.	2	$21	$21	$50	$162	$163	231	$14	11.7	11.8
Water Subtotal					**$1,208**	**$1,209**	**327**	**$20**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	43,020	$3,104	1.3
Estimated Annual Savings	26,792	$1,609	0.8
Percent Savings	62%	52%	62%

* NI = Cost does not include incentive, WI = Cost includes incentive
* *The total cost column includes 14% taxes

Table 8 Water Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	2	$309	$150	$1,047	87%
Install water efficient toilets	2	$284	$150	$990	55%
Install water efficient showerheads	2	$21	$50	$162	29%
Install water efficient urinals	1	$344	$200	$620	60%

* The total cost column includes 14% taxes

5.3 GENERAL RECOMMENDATIONS

Lighting

The Fire Hall is used so infrequently that replacing the T12 lamps with T8s is not recommended. Consideration should be given to occupancy sensors for the lights.

Envelope

Since the majority of the annual energy consumption is used to heat the Fire Hall, a significant amount of savings would result from weather-stripping the two pedestrian doors. The approximate annual savings would be just under 3,000 kWh with a payback period of 0.9 years.

HVAC

Another recommendation that would result in large savings with a short payback period is to install thermostats that would keep the temperature of the Fire Hall at 15°C (59°F) unless the building is occupied. An occupancy sensor should be installed such that when the hall is occupied, the thermostat will set the temperature up to 21°C (70°F) for a short period of time (5 hours). Annual energy savings of over 3,500 kWh per year would save $225 annually with a payback period of just over 6 years.

A vehicle emissions sensor could be installed to control the ventilation in the Fire Hall. This sensor would monitor the level of carbon monoxide (CO) and would switch the ventilation fan on when CO levels are above a certain limit. The purpose of this ventilation solution is to ensure good air quality while using a minimum amount of energy.

Water

Water consumption for the Fire Hall can be reduced by replacing the current sinks, toilets, and showerheads with water efficient fixtures. Table B.4.5 in Appendix B shows the results from this analysis.

6.0 SEWAGE LIFT STATION / GENERATOR BUILDING

6.1 BACKGROUND

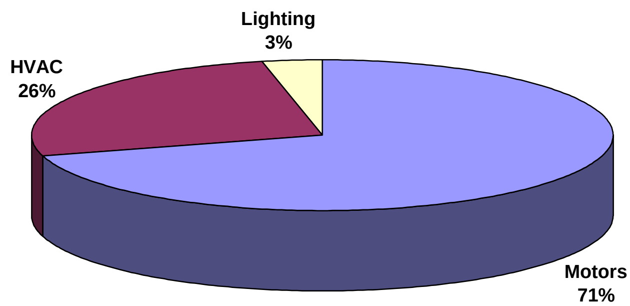
The Sewage Lift Station was built in 1960 and consists of two small buildings of approximately 270 square feet each. One of the buildings houses the generator for the pumps in case of a power failure, while the other is the sewage pumping station. The lift station is occupied periodically for servicing.

Photo 5- Sewage Lift Station

Photo 6 - Sewage Lift Station – Generator Building

These buildings are heated electrically and consumed 54,000 kWh over the past 12-month period for heating, lighting, and motors for the sewage pumps. The following pie chart shows how the energy is split among these three things.

Energy Breakdown (% of Total kWh) for the Sewage Lift Station/ Generator Building



There are no water fixtures in either of these buildings and therefore, no water is being consumed.

6.2 ENERGY SAVING OPPORTUNITIES

Table 9 below shows a summary of the energy saving opportunities for the Sewage Lift Station and Generator Building. The following assumptions were made in the calculations:

- The buildings are only occupied 2 hours per week year round.
- The outdoor lights are on 12 hours per day year round.
- The temperature is maintained at 15°C (59°F).

Table 9 Energy Saving Opportunities for the Sewage Lift Station / Generator Building

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace exterior incandescent lamps with high-pressure sodium lights.	1	$130	$93	$130	$296	$254	517	$31	9.6	8.2
Lighting Subtotal					**$296**	**$254**	**517**	**$31**		
ENVELOPE										
Weatherstrip pumping station wood doors.	1	$15	$15	$50	$74	$74	1,202	$72	1.0	1.0
Replace and weatherstrip generator building wood doors.	2	$350	$350	$100	$1,026	$1,026	4,411	$265	3.9	3.9
Add R20 insultation to the exterior walls.	1	$3,870	$3,280	$3,870	$8,824	$8,151	2,803	$168	52.4	48.4
Envelope Subtotal					**$9,924**	**$9,251**	**8,416**	**$505**		
HVAC										
Setback temperature to 10 ^{o}C (50 ^{o}F)	N/A	0	0	0	0	0	3,999	$240	0	0
Replace outside damper with insulated damper.	1	$200	$200	$200	$456	$456	261	$16	29.1	29.1
HVAC Subtototal					**$456**	**$456**	**4,260**	**$256**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	53,640	$3,917	1.6
Estimated Annual Savings	13,193	$792	0.4
Percent Savings	25%	20%	25%

* NI = Cost does not include incentive, WI = Cost includes incentive
* *The total cost column includes 14% taxes

6.3 GENERAL RECOMMENDATIONS

Lighting

The only energy saving opportunities for the Sewage Lift Station in terms of lighting are in replacing the exterior incandescent light with a high pressure sodium light. Since the indoor lights are only used for approximately 2 hours per week, replacing these lights would not result in significant energy savings. The lighting analysis summary for this station is shown in Appendix B, Table B.5.3.

Envelope

From Table 9 it can be seen that over 8,000 kWh of energy could be saved by replacing the wood doors in the generator building, weather-stripping the doors, and re-insulating the exterior walls of the buildings. Further details are shown in Appendix B, Table B.5.4.

HVAC

Reducing the temperature setting in both buildings from 15^{o}C to 10^{o}C would result in large energy savings with no installation costs. Replacing the diesel generator exhaust damper with an insulated damper would reduce heat losses, however, the payback period for this upgrade is long.

7.0 RESOURCE CENTRE CDC AND MUNICIPAL OFFICES

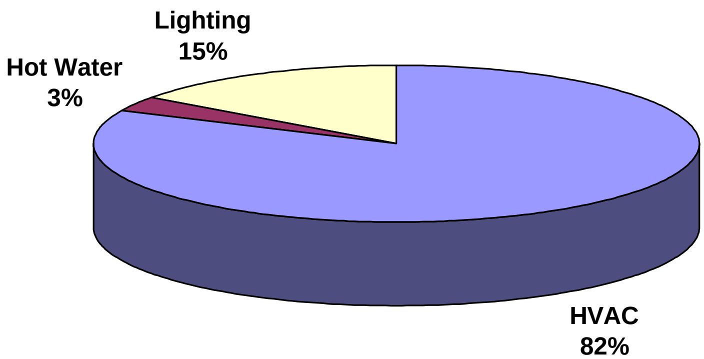
7.1 BACKGROUND

The Resource Centre is a 4,700 square foot building that houses municipal offices and a fitness club. In 1997, the inside of this building was reconstructed. A program was set up with Manitoba Hydro to upgrade these walls by adding 7" thick insulation for a total wall thickness of 10-12". The offices in this building are occupied year round for 40 hours a week.

Photo 7 - Resource Centre

The Resource Centre uses electricity exclusively with a total consumption of 72,000 kWh for the previous year. This total energy is split between lighting, heating, and water heating as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Resource Centre CDC and Municipal Offices



There are two washrooms on the main floor of the Resource Centre that contain one shower, two sinks, and two toilets. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. A total annual hot water consumption was then established.

7.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 10 and 11 show the energy and water saving opportunities for the Resource Centre. The following assumptions were made in the analysis:

- The Resource Centre CDC and Municipal Offices are occupied 40 hours a week year round.
- The temperature of the Centre is maintained at 21°C (70°F) at all times.
- For the purpose of water consumption, the typical occupancy of the Resource Centre is 12.
- The exit lamps are on 24 hours per day year round and the exterior lights are on for 12 hours a day year round.

Table 10 Energy Saving Opportunities for the Resource Centre CDC and Municipal Offices

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	1	$50	$5	$80	$148	$97	237	$14	10.4	6.8
Replace exterior flood lamps with high pressure sodium lights.	6	$130	$93	$130	$1,778	$1,522	1,314	$79	22.5	19.3
Replace exterior incandescent lamps with high pressure sodium lights.	1	$130	$93	$130	$296	$254	219	$13	22.5	19.3
Parking lot controllers.	5	$100	$75	$150	$1,425	$1,283	1,800	$108	13.2	11.9
Lighting Subtotal					**$3,648**	**$3,155**	**3,570**	**$214**		
ENVELOPE										
Replace broken windows.	2	$800	$644	$200	$2,280	$1,924	2,709	$163	14.0	11.8
Weatherstrip doors.	3	$15	$15	$50	$222	$222	4,248	$255	0.9	0.9
Seal windows.	6	$5	$5	$25	$205	$205	4,532	$272	0.8	0.8
Envelope Subtotal					**$2,708**	**$2,352**	**11,489**	**$690**		
HVAC										
Install programmable thermostat; Setback temp to 15 ^{o}C (59 ^{o}F).	2	$300	$300	$300	$1,368	$1,368	5,138	$308	4.4	4.4
Install motorized dampers on HRV intakes	2	$200	$200	$200	$912	$912	10,363	$622	1.5	1.5
Install geothermal heat pump.	1	$14,250	$8,750	$14,250	$32,490	$26,220	27,546	$1,654	19.6	15.9
HVAC Subtototal					**$34,770**	**$28,500**	**43,047**	**$2,585**		
HOT WATER										
Install water efficient metering faucets.	2	$309	$309	$150	$1,047	$1,047	524	$31	33.3	33.3
Water Subtotal					**$1,047**	**$1,047**	**524**	**$31**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	71,600	$5,035	2.1
Estimated Annual Savings	58,629	$3,520	1.7
Percent Savings	82%	70%	81%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

Table 11 Water Saving Opportunities for the Resource Centre CDC and Municipal Offices

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	2	$309	$150	$1,047	80%
Install water efficient toilets.	2	$284	$150	$990	55%
Install water efficient showerheads.	1	$21	$50	$81	29%

* The total cost column includes 14% taxes

7.3 GENERAL RECOMMENDATIONS

Lighting

The majority of the lights in this building are fluorescent lamps that have already been converted from T12s to T5s. However, there is still a potential for energy savings in replacing the exterior incandescent light bulbs with high-pressure sodium lights. This upgrade would save over 1,000 kWh per year. Installing parking lot controllers would save over 1,500 kWh. Parking lot controllers save energy by automatically adjusting power at the car plugs depending on the outside temperature. The lighting analysis summary can be found in Table B.6.3.

Envelope

Heat is being lost through the windows and doors at the Resource Centre. This heat loss would be substantially reduced if the windows and doors were re-sealed and if the two broken windows were replaced. From Table 10 it can be seen that over 11,000 kWh would be saved in making the proposed changes to the building's envelope.

HVAC

Installing programmable thermostats would allow one to program the thermostat such that the temperature is set down to 15°C (59°F) when the Resource Centre is unoccupied. This would save over 5,000 kWh per year in energy consumption. The thermostat in the fitness club should be wired to the light switches since this area of the building is only occupied intermittently on an unknown schedule. Installing motorized dampers on the HRV intakes would result in energy savings with a short payback period.

A geothermal heating system is also proposed for this facility. The existing electric furnaces would be replaced with water-to-air heat pumps connected to a closed loop ground water system. A geothermal heat pump is one of the most energy efficient and environmentally friendly electric heating and cooling systems available and would cut annual heating costs by 47%. Manitoba Hydro provides incentives for this installation.

Water

Water savings would result from installing water efficient fixtures in the main floor washroom. Although the calculated payback period shown in Table 10 for replacing the faucets is high, this value does not consider the reduction in cost due to water savings.

7.4 OPERATION AND MAINTENANCE

The following operation and maintenance activities will result in energy and water savings at this facility:

- Clean air conditioning condenser coils seasonally.

Also refer to section 16 for more information.

8.0 MUNICIPAL GARAGE

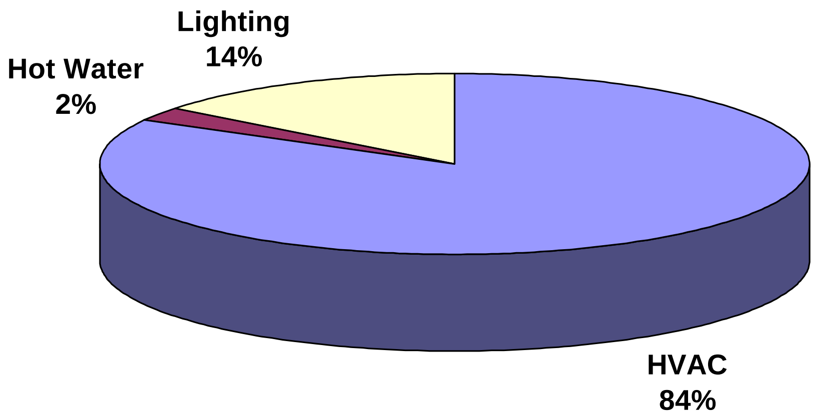
8.1 BACKGROUND

Maintenance for town vehicles and equipment is performed at the Municipal Garage. This 1,836 square foot building was constructed in 1982 of metal framing with metal cladding on both the inside and outside walls. The garage is occupied Monday to Friday from 8am to 5pm year round.

Photo 8 – Municipal Garage

The electricity consumed over the past year totaled 52,000 kWh for a cost of $3,700. The majority of this energy is used to heat the garage, as can be seen in the pie chart below.

Energy Breakdown (% of Total kWh) for the Municipal Garage



There is one washroom in the garage with one lavatory and one water closet. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. A total annual hot water consumption was then established.

8.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 12 and 13 show the energy and water saving opportunities for the Municipal Garage. The following assumptions were made in the analysis:

- The garage is occupied 40 hours per week year round.
- The outdoor lights are on 12 hours per day year round.
- For the purpose of water consumption, the typical occupancy is 2.
- The temperature of the garage is maintained at 21°C (70°F).

Table 12 Energy Saving Opportunities for the Municipal Garage

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace exterior incandescent lamps with compact fluorescents.	1	$130	$93	$130	$296	$254	219	$13	22.5	19.3
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	13	$75	$40	$75	$2,223	$1,704	3,353	$201	11.0	8.5
Retrofit 4'x2 T12 fluorescents with T8 ballast and tubes.	4	$55	$35	$60	$524	$433	324	$19	26.9	22.2
Lighting Subtotal					**$3,044**	**$2,391**	**3,896**	**$234**		
ENVELOPE										
Weatherstrip pedestrian doors.	3	$15	$15	$50	$222	$222	4,248	$255	0.9	0.9
Weatherstrip vehicle doors.	3	$30	$30	$100	$445	$445	9,984	$599	0.7	0.7
Envelope Subtotal					**$667**	**$667**	**14,232**	**$854**		
HVAC										
Install programmable thermostat; Setback temp to 15 ^{o}C (59 ^{o}F)	2	$300	$300	$300	$1,368	$1,368	3,501	$210	6.5	6.5
Provide motorized damper on exhaust fan.	1	$200	$200	$200	$456	$456	1,658	$100	4.6	4.6
Provide vehicle emissions monitoring control of ventilation systems.	1	$850	$850	$200	$1,197	$1,197	9,948	$597	2.0	2.0
HVAC Subtototal					**$3,021**	**$3,021**	**15,107**	**$907**		
HOT WATER										
Install water efficient metering faucets.	1	$309	$309	$150	$523	$523	100	$6	87.4	87.3
Replace existing water heater with instantaneous water heater.	1	$300	$300	$900	$1,368	$1,368	1,164	$70	19.6	19.6
Water Subtotal					**$1,891**	**$1,891**	**1,264**	**$76**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	52,240	$3,720	1.6
Estimated Annual Savings	34,499	$2,071	1.0
Percent Savings	66%	56%	63%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

Table 13 Water Saving Opportunities for the Municipal Garage

Description	Qty	Installed Cost/Unit ($)		Total Cost ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	1	$309	$150	$523	80%
Install water efficient toilets.	1	$284	$150	$495	55%

* The total cost column includes 14% taxes

8.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the 8' T12s with T8s would result in large energy savings with a payback period of 11 years. The payback period for the 4' T8s is even longer due to the smaller watt savings per bulb.

Envelope

There are two vehicle doors that are each 11.5' wide by 12' high. A large amount of heat is being lost through the cracks around these doors. From Table 12 it can be seen that replacing the weather-stripping around the vehicle and pedestrian doors would result in large annual energy savings with a short payback period.

HVAC

Installing a programmable thermostat and setting the temperature back to 15°C (59°F) when the garage is unoccupied would save over 3,000 kWh of heat in a typical year. Energy savings would also result from replacing the back draft damper on the exhaust vent with a motorized damper (1,658 kWh).

Another option is to provide vehicle emissions monitoring control of the ventilation system. This would monitor the amount of carbon monoxide in the garage and would ventilate only when CO levels are above a certain value.

Water

From Table 13 it can be seen that installing water efficient fixtures in the washroom would reduce the water consumption. Although the payback period for replacing the faucets shown in Table 12 is high, the additional cost savings that would result from the reduction in water consumption would reduce this payback period substantially. The heat losses from the water heater would be eliminated if this water heater was replaced with an instantaneous water heater.

8.4 OPERATION AND MAINTENANCE

Based on the inspection this facility, the following operation and maintenance activity should be performed:

- Clean unit heaters.

Also refer to section 16 for more information.

9.0 BIRDTAIL COUNTRY MUSEUM

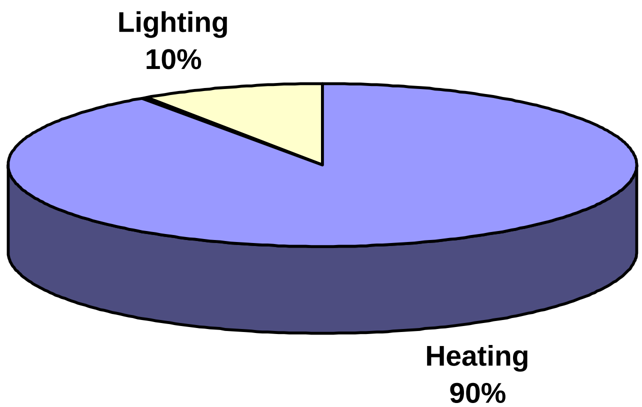
9.1 BACKGROUND

The Birdtail Country Museum is a heritage building constructed in 1902. This two-story building is 3,500 square feet and is constructed of masonry covered with stucco on the east and west walls and metal/wood cladding on the south wall. There is no insulation in these walls but the roof was recently repaired and insulated.

Photo 9 - Birdtail Country Museum

The total electricity consumption over the past year was 33,540 kWh with the majority of this energy used for heating as can be seen in the pie chart below.

Energy Breakdown (% of Total kWh) for the Birdtail Country Museum



The museum has one washroom with a lavatory and water closet. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. A total annual hot water consumption was then established. For this building, the hot water consumption was negligible.

9.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 14 and 15 show a summary of the energy and water savings opportunities for the Birdtail Country Museum. The following assumptions were made in the analysis:

- The museum is occupied for 10 hours per week year round.
- The temperature is maintained at 10°C (50°F) in the winter.
- For the purpose of water consumption, the typical occupancy is 4.

Table 14 Energy Saving Opportunities for the Birtail Country Museum

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	5	$75	$40	$75	$855	$656	101	$6	140.4	107.7
Replace 60 W indoor incandescents with compact fluorescents.	19	$15	$10	$13	$596	$487	464	$28	21.4	17.5
Replace 100W indoor incandescents with compact fluorescents.	3	$15	$10	$13	$94	$77	231	$14	6.8	5.6
Lighting Subtotal					**$1,545**	**$1,220**	**797**	**$48**		
ENVELOPE										
Seal windows.	10	$5	$5	$25	$342	$342	2,695	$162	2.1	2.1
Replace and weatherstrip wood doors.	3	$350	$350	$100	$1,539	$1,539	4,197	$252	6.1	6.1
Replace and seal boarded up windows.	2	$750	$620	$200	$2,166	$1,870	2,051	$123	17.6	15.2
Insulate East and West Walls with R20.	1	$8,000	$6,500	$8,000	$18,240	$16,530	6,427	$386	47.3	42.8
Envelope Subtotal					**$22,287**	**$20,281**	**15,371**	**$923**		
HOT WATER										
Install water efficient metering faucets.	1	$309	$309	$150	$523	$523	87	$5	99.8	99.8
Water Subtotal					**$523**	**$523**	**87**	**$5**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	33,540	$2,421	1.0
Estimated Annual Savings	16,254	$976	0.5
Percent Savings	48%	40%	50%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

Table 15 Water Saving Opportunities for the Birdtail Country Museum

Description	Qty	Installed Cost/Unit ($)		Total Cost ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	1	$309	$150	$523	80%
Install water efficient toilets.	1	$284	$150	$495	55%

* The total cost column includes 14% taxes

9.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the lights in the museum would result in annual energy savings of 800 kWh with a long payback period. The reason for the long payback period is that the lights in the museum are assumed to be running for only 10 hours per week.

Envelope

Since the museum is a heritage building, certain upgrades to the building's envelope may be costly. The east and west walls of the museum were recently stuccoed and windows were recently replaced, it is therefore assumed that insulating these walls and replacing the broken windows would be acceptable. Replacing the broken windows and sealing and weather-stripping the windows and doors would save almost 9,000 kWh in a year.

Water

As shown in Table 15, replacing the water fixtures in the washroom with water efficient fixtures would save 80% of the water consumed by the sink and 55% of the water consumed by the toilet.

10.0 RECYCLING DEPOT

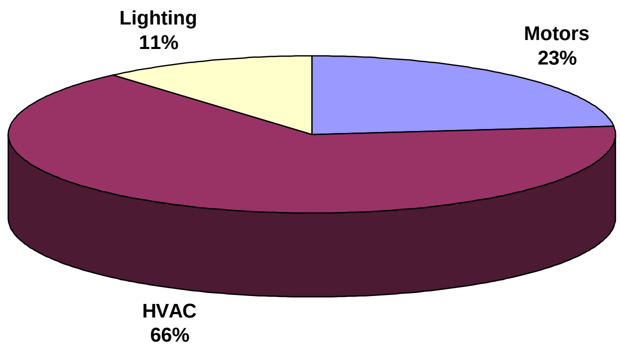
10.1 BACKGROUND

The Recycling Depot is an old 192 square foot wood building with no insulation. There is one old door and two old leaky windows. This building is occupied for approximately 17 hours per week year round.

Photo 10- Recycling Depot

The Recycling Depot uses electricity exclusively for heating, lighting, and to run the motors for the can and glass crushers. The following pie chart shows how the energy is consumed in a typical year.

Energy Breakdown (% of Total kWh) for the Recycling Depot



There are no water fixtures in the Recycling Depot.

10.2 ENERGY SAVING OPPORTUNITIES

Table 16 shows a summary of the energy saving opportunities for the Recycling Depot. The following assumptions were made in the analysis:

- The Recycling Depot is occupied for 17 hours per week year round.
- The exterior lights are on 12 hours per day year round.
- The temperature is maintained at 10°C (50°F) in the winter.

Table 16 Energy Saving Opportunities for the Recycling Depot

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
When indoor 100W incandescents require replacement, replace them with compact fluorescents.	1	$13	$8	$0	$15	$9	65	$4	3.8	2.3
When indoor 150W incandescents require replacement, replace them with compact fluorescents.	3	$13	$8	$0	$44	$27	292	$18	2.5	1.6
Replace outdoor 100W incandescents with high pressure sodium lights.	1	$130	$93	$130	$296	$254	219	$13	22.5	19.3
Lighting Subtotal					**$356**	**$290**	**576**	**$35**		
ENVELOPE										
Replace Building - R20 walls, R-40 roof, 1 3'x6'8" door, 1 4'x3' window.	1	$9,000	$9,000	$9,000	$20,520	$20,520	3,816	$229	89.6	89.6
Envelope Subtotal					**$20,520**	**$20,520**	**3,816**	**$229**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	8,200	$801	0.2
Estimated Annual Savings	4,392	$264	0.1
Percent Savings	54%	33%	50%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

10.3 GENERAL RECOMMENDATIONS

Lighting

Energy savings of approximately 350 kWh would result from replacing the indoor incandescent lights with compact fluorescents.

Envelope

Since the envelope of the Recycling Depot is in such poor condition, consideration should be given to replacing the building. Building a new 12’ x 16’ x 8’ wood frame structure with R-20 walls, an R-40 roof, a 3’ x 6’ 8” door, and a 4’ x 3’ window would cost approximately $18,000 before taxes. This new building would save almost 50% of the current energy consumption.

11.0 TOURIST INFORMATION BUILDING

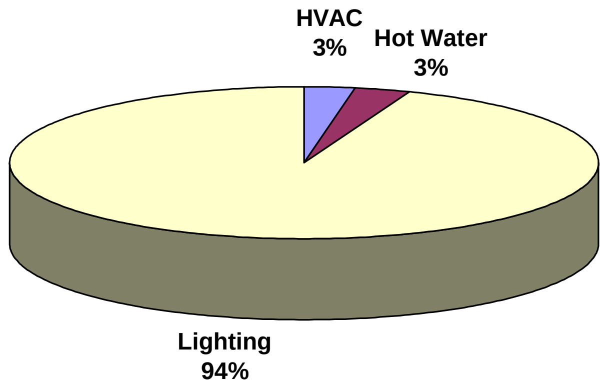
11.1 BACKGROUND

The Tourist Information Building is an old church constructed in the early 1900s. This wood frame structure is 1,475 square feet with no insulation in either the walls or the roof. Insulation is not required in this building as it is only occupied in the summer months. In the winter, the heat is shut off.

Photo 11 - Tourist Information Building

Since there is almost no heating in this building, the electricity consumption is low; the majority of energy is used for lighting as shown in the following pie chart. The total annual energy consumption for the previous year was 4,700 kWh.

Energy Breakdown (% of Total kWh) for the Tourist Information Building



There is one washroom in this building with a toilet and a sink. The hot water consumed by the sink was calculated by estimating the frequency at which it is used.

11.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 17 and 18 show the energy and water saving opportunities for the Tourist Information Building. The following assumptions were made in the analysis:

- The indoor lights are on for 12 hours per day for four months of the summer.
- The outdoor lights are on for 12 hours per day year round.

Table 17 Energy Saving Opportunities for the Tourist Information Building

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace 60 W incandescents with compact fluorescents.	6	$15	$10	$13	$188	$154	389	23	8.1	6.6
Replace 150 W incandescents with compact fluorescents.	10	$15	$10	$13	$314	$257	1,584	95	3.3	2.7
Replace 300 W incandescents with compact fluorescents.	2	$15	$10	$13	$63	$51	639	38	1.6	1.3
Lighting Subtotal					**$564**	**$462**	**2,612**	**$157**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	4,690	$537	0.14
Estimated Annual Savings	2,612	$157	0.08
Percent Savings	56%	29%	57%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

Table 18 Water Saving Opportunities for the Tourist Information Building

Description	Qty	Installed Cost/Unit ($)		Total Cost ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	1	$309	$150	$523	80%
Install water efficient toilets.	1	$284	$150	$495	55%

* The total cost column includes 14% taxes

11.3 GENERAL RECOMMENDATIONS

Lighting

The best opportunities for energy savings in the Tourist Information Building are in replacing the lighting. The majority of the energy consumption for this building is from the incandescent lamps. Replacing these with compact fluorescent bulbs would save over 55% of the current energy consumption.

Envelope

The Tourist Information Building uses very little heat since the building is only occupied in the summer months and no heat is used throughout the winter. For this reason, upgrading the envelope would not result in significant energy savings.

Water

Installing a new water efficient toilet and metering faucet in the washroom would save 55 % and 80% respectively, of the current fixtures' water consumption.

12.0 WATER TREATMENT PLANT

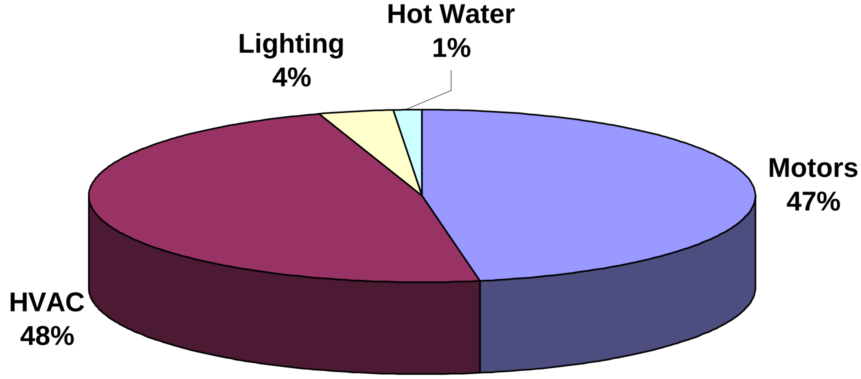
12.1 BACKGROUND

The Water Treatment Plant consists of an old section that was constructed in approximately 1960 and houses the water filters and a new section that was constructed in 1986 and houses the raw water pumps and chemical feed containers.

Photo 12 - Water Treatment Plant

In the previous year, 126,000 kWh of electricity was used for heating, lighting, hot water and to power the motors as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Water Treatment Plant



12.2 ENERGY SAVING OPPORTUNITIES

Table 19 shows the energy saving opportunities for the Water Treatment Plant. The following assumptions were made in the analysis:

- The lights are on for 6 hours a day year round.
- The temperature is maintained at 15°C (59°F) in the winter months.

Table 19 Energy Saving Opportunities for the Water Treatment Plant

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Retrofit 8' x 2 T12 fluorescents with T8 ballast and tubes.	6	$75	$40	$75	$1,026	$787	1,589	$95	10.8	8.2
Replace interior incandescents with compact fluorescents.	1	$15	$10	$13	$31	$26	324	$19	1.6	1.3
Lighting Subtotal					**$1,057**	**$812**	**1,913**	**$115**		
ENVELOPE										
Weatherstrip doors.	1	$15	$15	$50	$74	$74	2,324	$140	0.5	0.5
Seal windows.	2	$5	$5	$25	$68	$68	609	$37	1.9	1.9
Upgrade Insulation.	1	$4,500	$3,500	$4,500	$10,260	$9,120	6,227	$374	27.4	24.4
Envelope Subtotal					**$10,403**	**$9,263**	**9,160**	**$550**		
HVAC										
Reduce temperature to 10 °C (59 °F).	NA	$0	$0	$0	$0	$0	12,459	$748	0	0
Install motorized damper on exhaust fan.	1	$300	$300	$300	$684	$684	1,408	$85	8.1	8.1
HVAC Subtotal					**$684**	**$684**	**13,867**	**$833**		
HOT WATER										
Replace water heater with instantaneous water heater.	1	$300	$300	$900	$1,368	$1,368	1,164	$70	19.6	19.6
Water Subtotal					**$1,368**	**$1,368**	**1,164**	**$70**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	126,740	$8,594	3.78
Estimated Annual Savings	26,104	$1,567	0.78
Percent Savings	21%	18%	21%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

12.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the indoor lights in the Water Treatment Plant would result in energy savings of almost 2,000 kWh. The majority of these savings are a result of replacing the 8' T12 lamps and ballasts with T8s.

Envelope

Weather-stripping the doors, sealing the windows and upgrading the wall insulation would result in significant energy savings of over 9,000 kWh.

HVAC

The Water Treatment Plant is currently maintained at 15^{o}C. Reducing this temperature setting to 10^{o}C would add no additional costs and would save over $700 in the annual heating bill. Reductions in energy consumption would also result from installing a motorized damper in the exhaust duct.

Water

A hot water tank is used to heat the water for the sample sink. This water tank is constantly losing heat to the room totaling approximately 1,000 kWh of energy in a year. Replacing this hot water tank with an instantaneous hot water tank would save almost all this energy.

13.0 RESERVOIR BUILDINGS

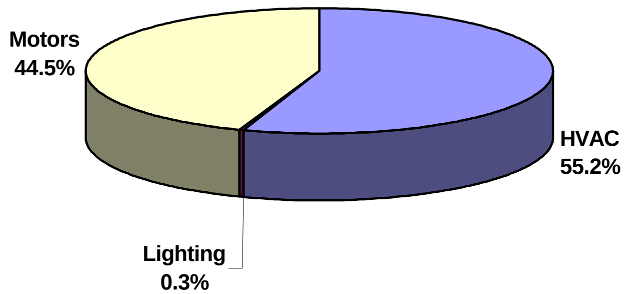
13.1 BACKGROUND

The Reservoir was built in 1976 and consists of two small buildings of approximately 360 square feet each. One of the buildings houses the pumps while the other is located above the reservoir. These buildings are occupied daily for sampling and servicing.

Photo 13 - Reservoir

Electricity is used for heating, lighting, and to power the motors. A total of 54,000 kWh of energy was consumed in the previous year and in a typical year, this energy is split up as shown in the following pie chart.

Energy Breakdown (% of Total kWh) for the Reservoir Buildings



13.2 ENERGY SAVING OPPORTUNITIES

Table 20 below shows the energy saving opportunities for the Reservoir. The following assumptions were made in the analysis:

- The Reservoir is occupied for 1 hour a day year round.
- The temperature is maintained at 15°C (59°F).

Table 20 Energy Saving Opportunities for the Reservoir Buildings

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
When replacing the interior incandescent lamps, replace them with compact fluorescents.	2	$13	$8	$0	$30	$18	108	$6	4.6	2.8
Lighting Subtotal					**$63**	**$51**	**108**	**$6**		
ENVELOPE										
Weatherstrip doors.	2	$15	$15	$50	$148	$148	2,445	$147	1.0	1.0
Insulate walls.	1	$3,500	$2,900	$3,500	$7,980	$7,296	10,968	$659	12.1	11.1
Envelope Subtotal					**$8,128**	**$7,444**	**13,413**	**$805**		
MOTORS										
When replacing 7.5 HP motors, replace them with high efficiency motors.	2	$100	$100	$0	$228	$228	588	$35	6.5	6.5
Motors Subtotal					**$228**	**$228**	**588**	**$35**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	54,060	$3,939	1.61
Estimated Annual Savings	14,108	$847	0.42
Percent Savings	26%	22%	26%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

13.3 GENERAL RECOMMENDATIONS

Lighting

Since the Reservoir buildings are only occupied for approximately 1 hour every day, only small energy savings would result from replacing the interior incandescent bulbs with compact fluorescents. However, this upgrade is still recommended due to its low installation cost and short payback period.

Envelope

Replacing the weather-stripping around the metal doors for both the Reservoir buildings would save over 2,000 kWh per year with a payback period of 1 year. Upgrading the wall insulation on both buildings would be costly but would save over 10,000 kWh in a year.

Motors

The motors consume almost half of the buildings' annual energy consumption. When these motors require replacement, they should be replaced with high efficiency motors. The additional cost of installing premium efficiency 7.5HP motors is minimal and therefore the payback period is short.

14.0 NORTH HILL BOOSTER STATION

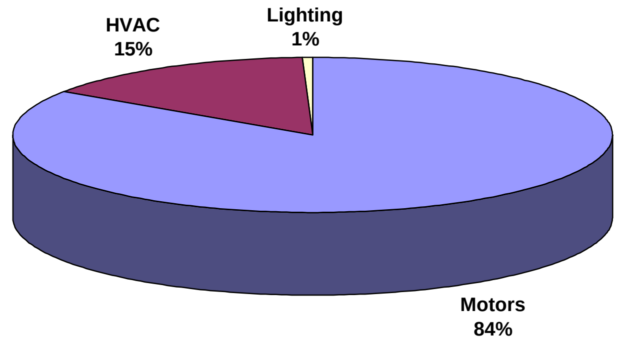
14.1 BACKGROUND

The North Hill Booster Station is a 215 square foot structure that houses A 7.5 HP pump that operates 24 hours a day year round. This building was constructed in 1988 of wood 2 x 4s, fiberglass insulation, a metal clad exterior, and a plywood clad interior. This station is occupied intermittently for servicing.

Photo 14 - North Hill Booster Station

Electricity is used exclusively for heating, lighting, and to power the booster pump motor. A total of 23,860 kWh was used in the previous year as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the North Hill Booster Station



14.2 ENERGY SAVING OPPORTUNITIES

Table 21 shows the energy improvement opportunities for the North Hill Booster Station. The following assumptions were made in the analysis:

- The station is occupied for only 1 hour every day.
- The temperature of the station is maintained at 10°C (50°F).
- The 7.5-hp motor runs 24 hours a day year round at 35% utilization.

Table 21 Energy Saving Opportunities for the North Hill Booster Station

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
When replacing the interior incandescents, replace them with compact fluorescents.	2	$13	$8	$0	$30	$18	102	$6	4.8	3.0
Lighting Subtotal					**$30**	**$18**	**102**	**$6**		
ENVELOPE										
Weatherstrip doors.	1	$15	$15	$50	$74	$74	830	$50	1.5	1.5
Upgrade wall insulation.	1	$1,700	$1,500	$1,700	$3,876	$3,648	901	$54	71.6	67.4
Envelope Subtotal					**$3,950**	**$3,722**	**1,731**	**$104**		
MOTORS										
When replacing the 7.5HP pump motor, replace it with a premium efficiency motor.	1	$100	$100	$0	$114	$114	514	$31	3.7	3.7
Motors Subtotal					**$114**	**$114**	**514**	**$31**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	23,860	$1,908	0.71
Estimated Annual Savings	2,347	$141	0.07
Percent Savings	10%	7%	10%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

14.2 GENERAL RECOMMENDATIONS

Lighting

Assuming that the lights are only on for 1 hour a day year round, energy savings of 100 kWh would result from replacing the interior incandescent lights with compact fluorescents.

Envelope

Since the temperature is maintained so low throughout the winter, minimal energy savings would result from upgrading the building's envelope. Weather-stripping the metal door and upgrading the wall insulation from R-12 to R-20 would save under 2,000 kWh of energy per year.

Motors

The 7.5 HP pump motor runs 24/7 year round. When this motor needs to be replaced, it should be replaced with a high efficiency motor; the payback for a premium efficiency 7.5HP motor is less than 4 years.

15.0 SOUTH HILL BOOSTER STATION

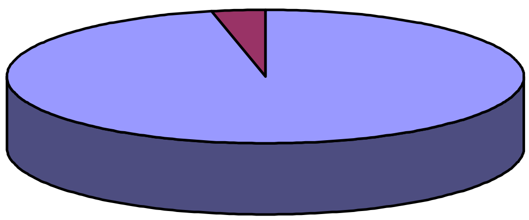
15.1 BACKGROUND

The South Hill Booster Station is a 215 square foot structure that houses a 7.5 HP pump. This building was constructed in the 1960s of wood 2 x 4s, fiberglass insulation, and wood exterior siding. This station is occupied intermittently for servicing.

Photo 15 - South Hill Booster Station

Electricity in this building is used exclusively for heating and lighting. The pump at this station is not in service; therefore, the energy consumption here is much lower than that of the North Hill Booster Station. A total of only 4,400 kWh was used in the previous year as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the South Hill Booster Station



15.2 ENERGY SAVING OPPORTUNITIES

Table 22 shows the energy saving opportunities for the South Hill Booster Station. The following assumptions were made in the analysis:

- The station is occupied for only 1 hour every day.
- The temperature is maintained at 10°C (50°F).

Table 22 Energy Saving Opportunities at the South Hill Booster Station

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$	NI*	WI*
LIGHTING										
Replace interior incandescents with compact fluorescents	2	$13	$8	$0	$30	$18	102	$6	4.8	3.0
Lighting Subtotal					**$30**	**$18**	**102**	**$6**		
ENVELOPE										
Weather-strip door	1	$15	$15	$50	$74	$74	830	$50	1.5	1.5
Upgrade wall insulation	1	$1,700	$1,500	$1,700	$3,876	$3,648	901	$54	71.6	67.4
Envelope Subtotal					**$3,950**	**$3,722**	**1,731**	**$104**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption	4,400	$494	0.13
Estimated Annual Savings	1,833	$110	0.05
Percent Savings	42%	22%	38%

* NI = Cost does not include incentive, WI = Cost includes incentive
** The total cost column includes 14% taxes

15.3 GENERAL RECOMMENDATIONS

Lighting

Assuming that the lights are only on for 1 hour a day year round, energy savings of 100 kWh would result from replacing the interior incandescent lights with compact fluorescents.

Envelope

Since the majority of the annual energy consumption for the South Hill Booster Station is used to heat the building, large savings would result from upgrades made to the building's envelope. Weatherstripping around the door and upgrading the wall insulation would save over 3,500 kWh per year.

16.0 GENERAL UPGRADES AND MAINTENANCE RECOMMENDATIONS FOR REDUCING ENERGY AND WATER CONSUMPTION

The following energy and water saving opportunities exist in many buildings including those toured in this study. The saving opportunities are generic in nature and include both capital upgrades (Sections 16.1 to 16.4) and maintenance activities (Section 16.5) that will result in energy / water savings for all the buildings.

16.1 LIGHTING AND ELECTRICAL

Light Switches – Place signs or stickers adjacent to switches to remind occupants to shut off switches when leaving rooms unoccupied. Occupancy sensors can be provided to shut off lights automatically when not in use. Timers can also be used in a similar fashion.

Fluorescent Lighting Systems – T12 lights should be upgraded to premium T8 or T5 electronic ballasts and lamps. This may be done when current T12 ballasts need replacement or in a planned retrofit program. Use cold-weather rated ballasts for retrofits in areas where the temperature is below 15°C (59°F). When selecting T8 electronic ballasts, please refer to Manitoba Hydro's Power Smart Lighting program for current listings of eligible ballasts. Contact Manitoba Hydro for details.

EXIT Signs – Replace all incandescent exit signs with 3W LED signs.

Incandescent Bulbs – All incandescent bulbs should be converted to compact fluorescents. Compact fluorescent bulbs last approximately 10 times longer than incandescents and save up to 75% of the energy costs.

Exterior Lights – Compact fluorescent bulbs do not function at low temperatures, therefore, the exterior lights should be replaced with high-pressure sodium lighting. High-pressure sodium lights are the most energy efficient type of lighting available today. Savings of approximately 50% would result from replacing exterior incandescent fixtures with these high-pressure sodium lights. Photos cells should be considered for automatically shutting off outdoor lights during day light conditions.

Parking Lot Controllers – Parking lot controllers save energy by automatically adjusting the power at the car plugs depending on the outside temperature.

Other Recommendations - Dispose of all fluorescent lamps and ballasts through a recycling company to reduce toxins entering the landfills.

Refer to Appendix D for a list of Manitoba Hydro's Power Smart incentives and listings of other incentive programs.

16.2 BUILDING ENVELOPE

Window/Door Infiltration – Seal drafts on windows and doors. This can be done by installing or upgrading weather-stripping, or with removable silicone caulking such as “Draft Stop” or “Peel and Seal”. Doors with high usage should be inspected twice per year for damaged weather stripping.

Window/Door Replacement – Windows and doors with low R-values should be considered for replacement. Manitoba Hydro offers incentives for new windows.

Wall / Roof Insulation – The wall insulation in older buildings typically has a resistance of R-12 or less. Large energy savings would result from upgrading this insulation to R-20. Similarly, roof insulation should be upgraded to R40. In addition to the energy savings, upgrading insulation also extends the life of a building by avoiding the rotting of wood framing from the development of mould and mildew in the walls.

Electrical Outlets – Install draft-reducing foam pads in all electrical receptacles.

16.3 HEATING, VENTILATION, AND AIR CONDITIONING

Temperature Control – Use programmable electronic thermostats where appropriate. Use the recommended “set-back” and “set forward” temperatures during unoccupied periods. A 3°C “set-back” over a 12 hour period can reduce heating costs by 4%. Terminate ventilation during un-occupied periods.

Air Conditioning – Reduce the cooling load on the air conditioner by keeping the facility a few degrees warmer and using fans at workstations to augment cooling of personnel. Provide an economizer to supply “free cooling” when it is cool outside and air conditioning is required.

Remove or insulate wall or window-mounted air conditioners for the winter season.

HVAC Ductwork – Seal duct joints with duct tape to reduce losses of heated or cooled air where the ducts traverse cold or hot areas respectively. Insulate duct work passing through unconditioned spaces.

Thermostat Equipped Electric Baseboard Heaters – Mark the thermostat “normal” setting to provide a visual cue as to when they are on or set too high.

16.4 WATER CONSUMPTION

Excessive water usage wastes energy, increases water / sewage treatment costs and further risks damage to the environment.

Toilet Tanks – Install flush volume reduction devices in existing toilet tanks to reduce the quantity of water used per flush by about 25%. "Early closing flapper valves" are inexpensive and are easily installed**.**

Toilets – When replacing older toilets or installing new ones, use high efficiency, low-flush volume models that require only 6 L (1.3 Imp. gal.) per flush. Refer to the toilet and drainline reports on the Canadian Water and Wastewater Association (CWWA) website for advice in selecting a toilet that will perform well.

Hot Water – In facilities where large volumes of hot water are not required, set the hot water tank thermostat to 55°C (131°F). A reduction from 60°C to the recommended value of 55°C saves approximately 3% of the energy related to hot water generation. Insulate the first 2 meters (6 ft) of the cold water line and as much of the hot water distribution lines as practical, particularly where hot water lines traverse cold spaces.

Shower Controls – In facilities where large amounts of water are used, consider retrofitting single actuator, short cycle (adjustable), self-closing control valves, with pressure-balancing temperature controls to reduce water consumption. These controls limit flow and allow for a preset water temperature (recommended 40°C) for the showers in order to reduce water heating costs and wastage of water.

Auto-Shut Off Fixtures - Consider using spring loaded fixtures that automatically shut off water flow in public areas.

Tankless Water Heaters – Consider replacing the hot water storage tanks with instantaneous water heaters to avoid storage tank losses and save energy.

16.5 MAINTENANCE

Maintenance activities are important to ensure that the equipment in a building is operating efficiently and to reduce the potential for future equipment breakdown. One option is to hire a maintenance contractor to perform inspections four times annually to clean, lubricate, test, and adjust the building's HVAC.

The following is a list of HVAC maintenance procedures that should be performed two to four times annually:

Heating/Ventilation Systems

- Change filters
- Inspect belts
- Inspect and clean heating coils
- Inspect operation of blower
- Inspect and lubricate motor and fan bearings
- Inspect and lubricate fresh air, exhaust air, and return air dampers

Air Conditioning/Ice Plant Systems

- Clean outdoor condensers
- Clean filters
- Check refrigerant and oil levels
- Inspect ice plant and refrigerant piping for leaks
- Inspect and lubricate brine pumps
- Inspect and lubricate motorized and back draft dampers
- Inspect A/C operation and adjust as required

17.0 IMPLEMENTATION OF ENERGY AND WATER SAVING OPPORTUNITIES

17.1 IMPLEMENTATION

The energy and water saving opportunities suggested in this report range from simply changing a light bulb to installing a geothermal heating system. Some of the simpler recommended upgrades can be completed in-house while others would require hiring a contractor to complete the work. Major renovation projects will require a consulting engineer to design and help implement the upgrade. The various energy/water saving opportunities discussed throughout this report are separated into three levels of implementation: (1) in-house implementations, (2) contractor implementations, and (3) consulting engineer implementations. The following sections discuss which upgrades fall into each of these three categories.

In-House Implementations

Some of the energy saving opportunities can be completed in-house. Replacing the incandescent light bulbs with compact fluorescent bulbs involves simply replacing the bulb and could easily be done by one of the building's maintenance personnel. Installing weather-stripping around the doors and sealing the windows could also be done in-house. For the saving opportunities that involve replacing the doors, some could be done in-house while for others, such as the vehicle doors, it is best to hire a contractor.

Contractor Implementations

The majority of the energy saving opportunities will require a contractor. In terms of lighting, replacing the T12s with T8s requires replacing the ballast as well as the bulbs. An electrician should be hired to complete this function. Replacing the exterior incandescent lights with high-pressure sodium lights and replacing the exit incandescent lamps with LED modules involve replacing the fixture and will therefore require an electrician.

Upgrades on a building's envelope not mentioned in the "In-House Implementations" section should be done by a contractor. This includes replacing windows and vehicle doors, and upgrading the wall and/or roof insulation.

In terms of HVAC, a contractor should be hired to install programmable thermostats and motorized dampers.

Electricians should be hired to replace motors with high-efficiency motors.

For the water saving opportunities involving installing low-flow water fixtures, a contractor will likely be required. Insulating the hot water tank, and installing an instantaneous water heater will also require a contractor.

Consulting Engineer Implementations

The only energy saving opportunity for the Town of Birtle that requires a consultant to implement is the geothermal heating system. This will require a detailed site investigation, bore hole testing, and energy modeling of the building to properly size the geothermal system.

Consulting services should also be considered for any major upgrades to building and services.

17.2 FINANCING

There are several incentive programs listed in Appendix D of this report that will help finance the implementation of the energy and water saving opportunities. In the "Energy Saving Opportunity" tables throughout this report, the capital costs are listed both with and without incentives. The incentives in these tables are from Manitoba Hydro's Power Smart Incentives and apply to energy efficient lighting and windows, wall insulation upgrades, and geothermal heating systems. For more information on these incentives, contact your local Manitoba Hydro Energy Services Coordinator or the contact listed in Table D.1.

Table D.2 lists other incentive programs that are available for energy saving upgrades. These programs are:

- Energy Innovators Initiative: Energy Retrofit Assistance (ERA)
- Municipal Rural Infrastructure Fund (MRIF)
- Renewable Energy Development Initiative (REDI)
- Community Places Program
- Sustainable Development Innovations Fund (SDIF)

For further information on these programs refer to the website listed in the table.

Members of the Association of Manitoba Municipalities also have the option of purchasing products and services in bulk at reduced prices through the Municipalities Trading Company of Manitoba Ltd. (MTCML). Details on this can be found in Appendix G of this report.

17.3 POLITICAL FRAMEWORK

General Municipal Environment in Manitoba

In Manitoba, municipal elections are set every 4 years. The next municipal election will be in October 2006, which may mean that some councils will see a change in members. However, we do not expect this to have a major impact on the plans to implement the recommendations of this report.

There are currently no Provincial or Federal targets or goals set that municipalities must achieve. 'Green Projects' have become common in Manitoba and often programs like the Municipal Rural Infrastructure Fund (MRIF) targets such projects. Details of this project are included in this report. Manitoba has been a leader in energy efficiency and many municipalities have partnered with other levels of government and companies like Manitoba Hydro on innovative projects. We believe the MMEP project is an excellent example of an innovative project and believe all of the participating communities are receptive to innovative ideas because they have agreed to participate.

A recent trend in municipal government has been toward longer-term planning. This is seen with the recent changes to the provincial Planning Act and the requirements for community sustainability plans in the New Deal agreement. The recommendations in this report certainly complement this direction.

Political Environment in Birtle

The only energy efficiency project that has taken place in the Municipality of Birtle was in upgrading the lighting in the Resource Centre CDC and Municipal Offices. In this building all the T12 fluorescent lamps and ballasts were converted to energy efficient T8s.

18.0 PERFORMANCE VERIFICATION

Following the implementation of the recommended energy and water saving opportunities, it is important to continuously monitor the annual energy consumption to keep a record of the resulting energy savings.

Appendix F contains a spreadsheet and graph for each of the buildings audited. These spreadsheets should be used as a tool to monitor the energy consumption on a monthly basis. The first three columns in each spreadsheet are for year 2004-2005 and have already been completed.

Following the implementation of the measures discussed in this report, the energy consumption should be recorded. The year headings may need to be re-entered, depending on when the implementations are completed. The monthly energy consumption in kWh taken from the building's hydro bill should be recorded in the "Billed Energy Consumption" column. The monthly energy consumption for heating depends on the outdoor temperatures for that month. The "Billed Energy Consumption" is therefore normalized to the year 2004-2005 such that a fair comparison can be made.

The normalized energy consumption is determined as follows:

$$NEC = BEC \times (\%\,Energy\,Used\;\;for\;Heating) \times \left(\frac{HDD(present)}{HDD(2004-2005)} \right) + BEC \times (1 - \%\,Energy\,Used\;\;for\;Heating)$$

Where *NEC* is the Energy Normalized to year 2004-2005, *BEC* is the billed energy consumption and *HDD* is the heating degree-days.

The heating degree-days (HDD) for a given day are the number of Celsius degrees that the mean temperature is below 18°C. This data can be found for the town of Shoal Lake on the following website:

http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=1.

Once the “Billed Energy Consumption” and “HDD” columns are filled in, the “Energy Normalized to 2004-2005” column is automatically calculated and the graph is updated. From this graph, the energy consumption can be monitored on a monthly basis to ensure that the upgrades are resulting in a reduction in energy consumption.

19.0 WATER AND SEWER AUDIT

19.1 WATER SYSTEM OVERVIEW

The Town of Birtle completed the construction of their water supply and distribution system in the 1960's. Birtle's raw water supply comes from a single artesian well located immediately adjacent to the water treatment plant that is approximately 60 meters deep. The well draws raw water from a confined aquifer located below the town. Data provided states that aesthetically, the water quality is generally poor and, because it is ground water, the water quality remains fairly consistent throughout the year.

A 10-horsepower raw water pump pumps water from the artesian well to the Birtle Water Treatment Plant. In the water treatment plant, the water is treated by aeration, pre-chlorination injection, and greensand filtration. Just before the water leaves the water treatment plant, it is chlorinated to maintain a disinfection residual within the distribution system. Two 15-horsepower distribution pumps convey water throughout the distribution system. Based on data provided, the average amount of water produced is 420 m3 per day with a maximum daily flow of approximately 800 m3. Water is stored in an underground concrete reservoir that has a storage capacity of 455 m3. From data provided, the average water produced is 586.9 litres per capita per day (lpcd).

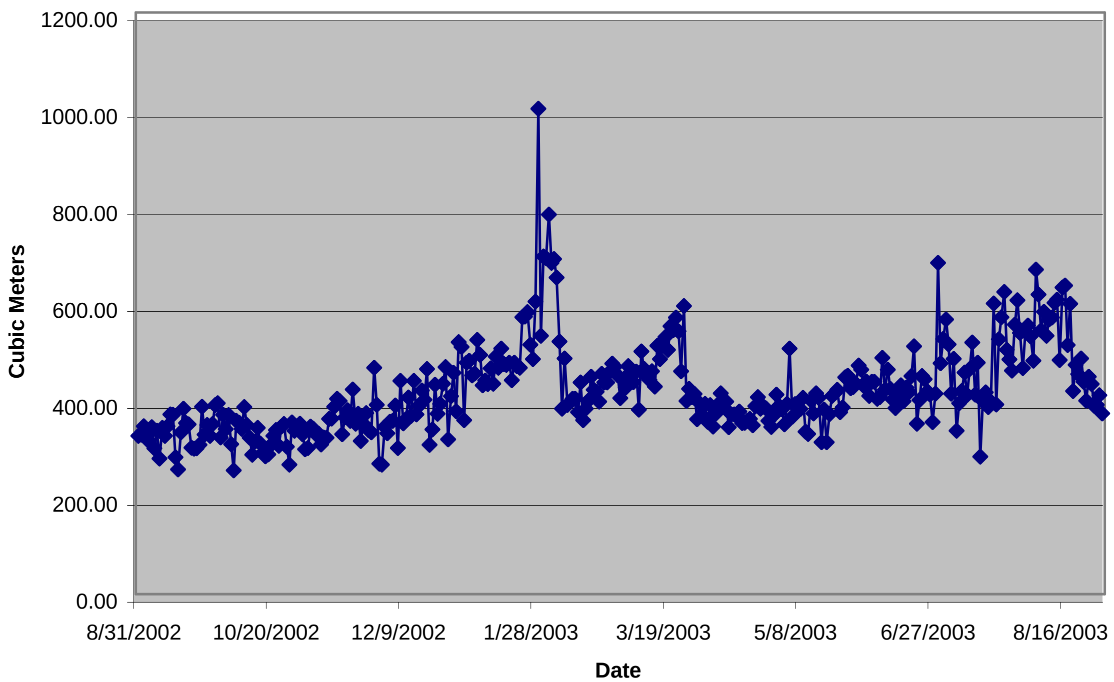
The water enters the distribution system at approximately 75 psi. No data was available regarding the current length of the distribution system, but the entire system is stated to consist of 150 mm (6 inch) of Blue Brute piping. There are two booster stations in Birtle (the North Hill Booster Station and the South Hill Booster Station) and a south hill reservoir and pump house. The North Hill booster station was built in 1988 and serves the north part of town, and the South Hill booster station was constructed in 1960, but is only used as a backup if the south hill reservoir station is down. The south part of town receives its water from a reservoir and pump house that was constructed in 1976. This pump house maintains the system pressure at 45 psi.

It is our understanding that the North Hill booster station operates on a twenty four hours per day, seven days per week basis. No variable frequency drive units or flow equalization capacity is available for the pumps at this location. Pump operation is on a start/stop basis without soft start capability.

There is currently no program in place for replacing old piping. The distribution system is repaired and replaced as breaks occur.

Information on the amount and cost of chemicals used over the course of a year, as well as annual operating and maintenance costs were unavailable. Chart 1 shows the daily water production for the period of September 2002 through August 2003.

Chart 1 – Daily Water Production



Water Meters

There is a 3-inch Rockwell International water meter that measures water produced at the water treatment plant in imperial gallons just before it enters the distribution system. There is also a 6-inch Rockwell International water meter that measures water leaving the south reservoir. Both water meters are aged and do not appear to have been recently replaced. As water meters age, the accuracy of the reading deteriorates resulting in inaccurate flow readings over time.

There are currently no water meters along the distribution system to measure the water consumption on a per client basis, but there are approximately 10 test meters in town.

Pumps

The distribution pumps, as well as the raw water pump, are located in the water treatment plant. The booster station pumps are located in their respective booster stations, and the reservoir pump is located in the reservoir pump house. Table 23 lists the relevant available pump data.

Table 23 Water Pump Data

Function	Motor Size (HP)	Motor Manufacturer
Raw Water Pump	10	U.S. Motor
Distribution Pump 1	15	Lincoln Electric
Distribution Pump 2	15	Lincoln Electric
North Hill Booster Pump	7.5	Unknown
South Hill Booster Pump	7.5	Baldor
Reservoir Pump 1	7.5	Baldor
Reservoir Pump 2	7.5	Lincoln Electric

Water Rates

Since there are no meters, clients are charged a flat quarterly rate for water and sewer service. Businesses throughout Birtle are charged based on their consumption as compared to a typical household. The amount of water used at a typical household is considered 1 “Residential Equivalent Unit.” Then, in order to calculate the amount a business should pay for water and sewer service, their calculated “Residential Equivalent Units” are multiplied by the base water commodity charge ($65.00 per quarter) and the base sewer commodity charge ($22.50 per quarter). There is also a customer service charge of $11.25 per quarter that every client must pay, regardless of their “Residential Equivalent Units.” Table 24 provides the billing rate structure for 2003.

Table 24 Water and Sewer Billing Rate Structure

Residential Equivalent Units	Number of Hook-Ups	Customer Service Charges	Sewer Commodity Charges	Water Commodity Charges	Total Quarterly Charges
1	357	$11.25	$22.50	$65.00	$98.75
1.5	4	$11.25	$33.75	$97.50	$142.50
2	7	$11.25	$45.00	$130.00	$186.25
3	3	$11.25	$67.50	$195.00	$273.75
4	7	$11.25	$90.00	$260.00	$361.25
5	1	$11.25	$112.50	$325.00	$448.75
6	1	$11.25	$135.00	$390.00	$536.25
8	1	$11.25	$180.00	$520.00	$711.25
10	1	$11.25	$225.00	$650.00	$886.25
12	1	$11.25	$270.00	$780.00	$1,061.25
15	1	$11.25	$337.50	$975.00	$1,323.75
25	1	$11.25	$562.50	$1,625.00	$2,198.75
35	1	$11.25	$787.50	$2,275.00	$3,073.75

Maintenance Programs

There is currently no scheduled maintenance program in place; however, the facility and equipment are inspected daily when the daily water meter reading is taken. Any problems that arise are dealt with as soon as possible.

The distribution system is flushed twice a year, once in the spring and once in the fall, however, no metering of the flushing volumes or estimates are made for the amount of water used.

19.2 WATER SYSTEM AUDIT RESULTS

In general, community water rates should be set at a level that covers the cost of supplying water to clients, including treating the water, distributing the water, maintaining the treatment and distribution systems, and replacement of key pumping and process equipment.

Water losses are defined as the difference between the total water produced by the water treatment plant and the total water consumed by the Town. Reducing the amount of water lost can have an impact on the overall cost of water treatment.

By reducing the amount of water loss, the Town will realize savings through reduced chemical costs related to treating the water, and reduced electrical costs associated with a reduction in the amount of pumping required to supply the water. Over a long-term prospect, the overall life of the facility and major process components can be extended, reducing the replacement frequency and equipment maintenance requirements.

Installation of water meters throughout the distribution system can also increase revenues for the Town by ensuring that customers are being billed for the actual amount of water they use. Environment Canada reports that communities that have water meters in place experience less water demand per capita than do communities that charge for water on a flat rate basis. As such, the Town would also potentially realize cost savings by reducing the amount of water to be treated and pumped.

From data provided for the period from September 2002 through August 2003, the average water production rate per capita was approximately 587 lpcd. Typical values of water consumption in Canadian municipalities using water meters range from 350 lpcd to 450 lpcd. If the Town of Birtle were to initiate a public education program promoting water conservation and install water meters throughout town so clients are charged based on the amount of water used, the Town could potentially see a decrease in water demand in the range of 20 to 40 percent. If this were to happen, Birtle would have reduced costs associated with chemicals used for treating the water and pumping costs for distributing the water by a proportionate amount. There would also be a secondary benefit in that less water would be entering the sewer system, so pumping costs would decrease on the sewer side as well.

Although, according to data received, the distribution system has only experienced one leak in the past 4 years, a program of regular scheduled leak detection can help prevent water loss from occurring in the future.

19.2.1 Unaccounted-For Water Loss

There was not sufficient data available to calculate the unaccounted-for water loss. Although the Town of Birtle keeps detailed daily records for the water treatment and distribution system, there were no records on the amount of water consumed by clients. Without information on water consumption, water losses cannot be determined. It is recommended that the Town of Birtle install water meters throughout the distribution system and that these meters be read on a quarterly basis so that the amount of water being consumed by clients can be determined.

Although the actual amount of water lost is uncertain, there are several factors that could influence the amount of water lost:

Leakage

Every distribution system experiences some amount of leakage. According to Environment Canada, municipalities that have an unaccounted-for water loss exceeding 10 to 15 percent find that a leak detection program is cost-effective. Environment Canada goes on to report that some studies have shown that for every $1.00 spent in communities with leak detection programs, up to $3.00 can be saved. Since Birtle does not have the required information in order to determine the unaccounted-for water loss, it is recommended that the Town develop a leak detection program for use in the near future.

Meter Accuracy

It is important to check the water meter at the treatment plant. If the production water meter is inaccurate, the Town will not have reliable data on the amount of water it is treating. This can lead to problems when trying to assess the amount of unaccounted-for water leaving the system, as more water will be leaving the system than is actually recorded.

If the Town does decide to install water meters throughout the distribution system, ensuring these meters are accurate will increase revenues for the Town since clients will be paying for the actual amount of water used. Accurate client meters will also allow the Town to better assess the amount of unaccounted-for water leaving the system, since water that would be unaccounted-for if the meters were inaccurate would actually be included in water consumption data.

Efforts should be made with respect to monitoring and recording other unmetered authorized water use such as flushing activities, filter backwashing, rink flooding, maintenance use and fire hall use. Ideally these flows would be metered such that the Town would be capable of accurately determining unaccounted for losses within the system.

Since the Town can not currently determine the amount of water lost from the system, it is much more difficult to develop a leakage prevention program.

Other

Other sources of unaccounted-for water loss include water main breaks and water main flushing. It is recommended that the Town keep track of the dates when breaks or flushing occurs and that the amount of water lost or used is estimated. This will increase the accuracy of any water audit performed in the future.

19.2.2 Maintenance Program

The Town should inspect the main water treatment plant meter and complete meter calibration on a routine basis. This will allow the Town to have accurate records pertaining to total water production. The Town should also develop a leakage detection program in order to reduce potential lost water.

19.2.3 Possible Cost Savings

Limited data is available for the identification of potential operational cost savings through process optimization. Flow metering at the water treatment plant consists of total treated water production entering the distribution system only. Backwashing is done on a daily basis to clean the filter in the Water Treatment Plant. Treated water volumes used for backwashing are not monitored, however are estimated at 9,700 m^3 annually. This corresponds to approximately 6.5% treated water production used for in-plant use. Backwashes are manually actuated on a daily basis to ensure quality of treated water. There are no filter-to-waste provisions on the existing treated water system, however if required in the future, this would require additional treated water volumes that may amount to approximately 3% of the current treated water production.

Typically, backwash volumes comprise of approximately 3-5% of the total annual treated water production. Although Birtle's backwash volumes are slightly higher that this amount, it appears to be within acceptable standards. Reductions from backwash volumes may be obtained through optimizing the backwash frequency while maintaining treated water quality distributed to the residents. Reductions in backwash volumes may approach approximately 2% of the annual treated water volume. Similar reductions in chlorine would be achieved through decreasing the volume of treated water.

Additional cost saving measures due to treatment processes can not be accurately determined without additional information relating to water consumption and losses within the distribution system. Backwash water volumes have been estimated from assumed values and backwash durations. Installation of a backwash flow metering device or raw water meter would provide the required information to be able to accurately determine backwash quantities and potential cost savings through backwash volume reductions.

The Town's best opportunity to achieve cost savings is to install client water meters at all service connections. Environment Canada states that the per capita water demand for communities that meter user consumption is significantly lower than communities that do not meter consumption. A reduction in water demand would reduce the amount of chemicals required over the course of a year, as well as reduce the number of hours pumps are operated.

Also, if the Town were to install a raw water meter at the water treatment plant and keep track of the amount of chemicals used to treat the water, it would be possible to determine if chemical usage could be optimized. In addition to reducing the water demand, adding client water meters throughout the distribution system would allow Birtle to determine the system's unaccounted-for water loss. Knowing the amount of water that is being lost through the system would allow Birtle to determine whether or not cost saving measures such as replacing older sections of distribution piping would be cost effective.

Without the water consumption data and monitoring of authorized water use within the community, the ability to identify process recommendations and distribution system upgrades is limited to general discussions. Quantification of potential water loss reductions and process related savings are highly dependent on the amount of water that passes through the treatment process. The treatment system employed by the Town of Birtle is relatively straightforward and generally consists of limited chemical addition and filtration. Potential savings related to the treatment process consist of reductions in chemical addition and energy costs associated with pumping requirements through the reduction of unaccounted for water losses.

19.3 SEWER SYSTEM OVERVIEW

The wastewater is pumped from the lift station to the two-cell sewage lagoon through a 200 mm (8 inch) PVC forcemain. Sewage lift station flows are currently unmetered. Other information regarding the sewer system overview, such as annual costs associated with the sewage system, was unavailable.

Pumps

Both of the pumps used to pump sewage to the lagoon are located in the sewage lift station. Currently, the Town does not estimate the annual volume of sewage that is pumped by the lift station, but pump operation times are recorded periodically. If the amount of sewage flowing through the system was decreased, there would be a direct savings associated with reduced pumping costs. Table 25 provides the relevant available pump data.

Table 25 Lift Station Pump Data

Function	Motor Size (HP)	Type	Manufacturer
Sewage Lift Station Pump 1	20	Submersible	Flygt
Sewage Lift Station Pump 2	20	Submersible	Flygt

Sewer Rates

Sewer rates are based on the same “Residential Equivalent Units” as the water rates and are charged quarterly. To determine the amount a client must pay, the clients “Residential Equivalent Units” are multiplied by $22.50.

Maintenance Programs

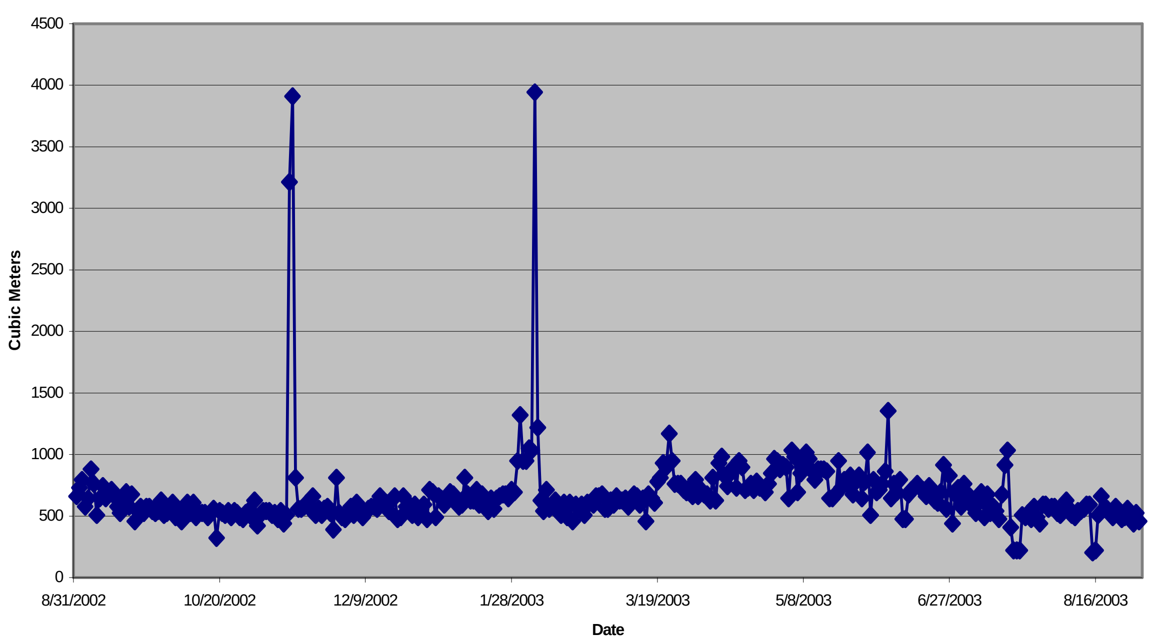
There is currently no scheduled maintenance program in place. Any problems that arise are dealt with as soon as possible.

19.4 SEWER SYSTEM AUDIT RESULTS

There is insufficient data available in order to provide a detailed assessment of the sewer system. Since most of the community receives their water through unmetered service connections, there is no information available on the amount of wastewater entering the sewage system. As such, the volume of storm water infiltrating the system or the costs involved with pumping and treating this added water cannot be accurately determined.

Pump hours were used in order to develop an estimate of the flow through the system. Using pump hours to estimate flows can be very inaccurate and will be affected by pump plugging, worn impellers, and other conditions, which result in a reduced volume of sewage actually pumped than would be expected for the recorded time frame. This will result in an exaggerated volume of sewage pumped. The second problem encountered with using pump hours is that the actual pump curve and operating conditions were unknown so peak operating conditions were assumed for an assumed 20 horsepower Flygt CP 3152 pump curve. Once again, this could lead to an exaggeration of the volume of sewage pumped. This data is presented in Chart 2.

Chart 2 – Estimated Sewer Flow



From this data, the average dry weather flow through the sewer system was estimated as approximately 550 m^3/day, and the wet weather flow was estimated as approximately 800 m^3/day. From this difference in flow, it can be assumed that the sewer system is experiencing significant infiltration. Through measures such as sealing manholes; lining pipes; disconnecting rain leaders, sump pumps, and weeping tiles from the sanitary sewer system; the Town could potentially decrease infiltration and inflows to the sewer system by up to 30 percent. Further studies should be conducted to determine the feasibility of these infiltration reduction options, since they may not be cost effective in the Town of Birtle's specific case. Reducing infiltration will reduce pumping costs and extend the effective life of the lagoons.

The Town should conduct a study in order to determine feasible options to deal with the extraneous storm water sources. This study would likely include a detailed review of manholes within the system and the televising of the sewage collection system. Installation of a magnetic flow meter would provide greater accuracy in determining the volume of wastewater pumped to the lagoon. This coupled with metering of the water consumption and water losses within the distribution system would allow better determination of the infiltration/inflow to the collection system.

19.4.1 Maintenance Program

The Town may wish to start a scheduled maintenance program, such as actively replacing old pipe, to help minimize potential problems with the sewer system and to spread out the cost of repairing and replacing old piping.

Routine maintenance should be conducted on lift station pumps to inspect, remove blockages, check wear, etc. It is easier and cheaper to replace the impellers of a pump than continue pumping at a reduced rate for an extended period of time.

By-Laws

Information on whether or not sump pumps, weeping tiles, and rain leaders were hooked up to the sanitary sewer system was not available. However, if these items are connected to the sanitary sewer system, the Town should consider instituting a by-law that prohibits any future hook-ups of sump pumps or weeping tiles to the sewer system in order to limit the amount of storm water entering the sewer system.

19.5 PUBLIC EDUCATION

Providing public education will create a better understanding of the water and wastewater treatment systems. If residents are aware of the processes and costs involved with treating and distributing drinking water and collecting and treating sewage, they will be more accepting of cost reduction efforts. A program that highlights the environmental and monetary benefits of water use reduction can help the community gain support for initiatives such as the following:

- Installing water meters, low flush toilets, or water saving showerheads.
- Fixing leaky taps and toilets.
- Only watering lawns once per week.
- Using drip irrigation for trees and shrubs.

19.6 RECOMMENDATIONS

It is recommended that the Town:

1. Install water meters at all service connections along the distribution system.
2. Develop a program for scheduled leak detection of the water distribution system.
3. Keep track of the dates when breaks or flushing occurs and meter all authorized municipal water use in order to accurately estimate the amount of water loss within the distribution system.
4. Install a flow meter at the sewage lift station and take daily meter readings so that the amount of water entering the lagoons is known.
5. Develop a routine maintenance program for the lift station pumps to ensure they continue to work at an efficient level.
6. Seal manholes and televise sewer pipes to reduce the effects and costs of infiltration entering the sanitary sewer system.
7. Conduct a study on the feasibility of options for reducing infiltration inflow to the sewage collection system. This may include televising the system and developing a staged collection system upgrade strategy.

8. Commence determining the annual unaccounted-for water loss percentage to determine when a leakage prevention program would be justified.

APPENDIX A

INVENTORY SHEETS

TABLE OF CONTENTS – APPENDIX A

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** September 15, 2005
Tour Personnel: Jim Vinnie	**Construction Date:** ~1975-76
Building: Distrist Community Center (Arena)	**Renovations:** No change to building envelop
L x W x H: 245’ x 125’ W x 18’ Rink, 12’ in reception; **Area:** 30,625 SF	
Building Occupancy: Approx 100	
Building Floor Plan: Skating rink, reception, and change rooms in basement.	**Occupied Times:** Used Oct – March in winter, 1 event per month in summer (fairs)

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
Metal liner insider + outside, 10” thick, metal frame
Roof Type/R-value:
Metal roof, exposed insulation under side
Door Type/weather stripping:
1 old wood vehicle door from rink to outside requires repair of concrete at base plus replacement of door, 1 new insulated vehicle door to zamboni garage ok, 2 glass doors to enter reception – replace stripping, 4 metal doors to exit rink, 2 metal doors to exit reception – replace stripping.
Window type/caulking:
None
Other:

MECHANICAL
Heating System:
Electric unit heaters in reception, no heat in rink, electric base boards in basement
Cooling System:
No A/C
Ventilation System:
Kitchen grease hood + intake duct? No heated MUA, Reception exhaust on wall, Ceiling fans, rink exhaust fan 30”Ø (no motorized damper) manual intake doors 2 (4’ x 1’)
HVAC Controls:
Integral thermostats on UH’s, Demand controller – heat shut off when ice plant runs
HVAC Maintenance/Training:
Shut down zamboni water heating system when not required.

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
2" to ice plant
Domestic Hot Water System:
2-40 gal – 1- 3000 W power smart plus 1 – 4500 w old style
Water Fixtures:
4 high flow sinks in washroom, 2 auto flush urinals, 4 high flow toilet (13.25 LPF) 4 high flow showers + 2 + toilet, one shower leaking badly.
ELECTRICAL
Indoor Lighting:
24 x 2 – 8' fluorescent – T12 – reception, 21 metal halide over rink ~ 600 W , 6 incandescent in service areas, Basement – 19 – 8' T12
Outdoor Lighting:
4 incandescent
Exit Signs:
12 incandescent
Motors:
Parking Lot Plugs:
One
OTHER BUILDING SYSTEMS
Zamboni water heating system: 2 – 120 gal. Storage tanks, pump, and 1 – A.O. Smith boiler: 300/247 MBH input/output
PROCESS SYSTEMS
Ice Plant – 75 hp motor on compressors, 20 hp motor on brine pump, 600 V 3 ph, Ammonia condenser Blanchard Ness 4 fans (dirty coils)
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro for building, propane for Zamboni water heating.

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** September 19, 2005
Tour Personnel: Andy Brydon 842-5135	**Construction Date:** Built 1959
Building: Community Hall (Disaster Center), Center Street	**Renovations:** New insulation on walls 20 years ago insulation blown into ceiling
L x W x H: 100" x 45" x 19" **Area:** 4500 SF	
Building Occupancy: Capacity = 300, 150 typical	
Building Floor Plan: Halls located on Main & Second Floors	**Occupied Times:** Bingo = 1/week – 3 hrs, Socials 2/month = 4 hrs each

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
2" x 4" added to block plus metal exterior cladding, blocks filled. Block wall with 1 ½" styrofoam
Roof Type/R-value:
Blow in insulation 12" thick
Door Type/weather stripping:
Weather stripping needs repair on doors. Doors are old wood (3) – replace
Window type/caulking:
No windows
Other:
MECHANICAL
Heating System:
Forced air electric old furnaces (3), 1 heats 61, 430 BTUH entrance, 2 heat hall (81 910 BTUH x2) on main floor electric base boards heat basement hall
Cooling System:
No A/C
Ventilation System:
No washroom exhaust in basement, exhaust fans in hall +2 washrooms, small exhaust fan in basement kitchen, 6" duct to entrance furnace for FA (kicked in), 1-6" to hall furnace (dirty and blocked), 1 furnace no intake, No deep friers
HVAC Controls:
1 stat for basement, baseboards, 3 stats for 3 furnaces standard stats.
HVAC Maintenance/Training:

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
No meter
Domestic Hot Water System:
Electric 40 gal standard tank
Water Fixtures:
Main Floor – washroom sink (2) – high flow, 2 urinals, toilets high flow (4) Basement – toilets 13.25 LPF (4), 2 kitchen sinks, washroom sink high flow (2)
ELECTRICAL
Indoor Lighting:
Basement – 20 x 2 –8' fluorescent T12 – 60 W Main Hall: 24 x 4 x 4'– T12
Outdoor Lighting:
See photos 2 incandescent 3 – HPS
Exit Signs:
2 incandescent in basement + 4 main floor
Motors:
N/A
Parking Lot Plugs:
NA
OTHER BUILDING SYSTEMS
Ready for portable generator – Disaster Center Inadequate ventilation in building.
PROCESS SYSTEMS
Possible mould in basement
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro only

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** September 16, 2005
Tour Personnel:	**Construction Date:** Same age as Hall?
Building: Curling Club, 186 – 11th Street	**Renovations:**
L x W x H: 60' x 175' x 20' max height / **Area:** 10,500 SF	
Building Occupancy: 75?	
Building Floor Plan:, Rink and 2 lounges	**Occupied Times:** Unknown

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
Metal clad exterior 2 sides, Roof on 2 sides to grade
Roof Type/R-value:
Exposed insulation in rink, needs new shingles, upgrade roof?
Door Type/weather stripping:
Insulated steel door (3) – replace weather stripping, 2 – old wood doors to rink from main floor, no stripping – replace both doors.
Window type/caulking:
Outdoor windows: Old 2 piece aluminum sliders 4 – 3'x2', needs caulking, Indoor windows to rink: 2 pane windows: 12' x 4' x 4 on 2nd floor. Main floor – 12' x 4' x 3' + 4' x 4' x 2 main floor to rink
Other:
MECHANICAL
Heating System:
New Oulet electric force flows with integral stat upstairs, baseboards in washroom with integral stats, Main floor – old force flows (4) – replace 4 old electric unit heaters in rink. Are they needed?
Cooling System:
None
Ventilation System:
East exhaust fan in rink runs all the time, poor BDD. @ - 2' x 2' intakes manually opened in rink., washroom exhaust , kitchen exhaust hood. No MUA
HVAC Controls:
HVAC Maintenance/Training:

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
Roof eaves trough goes to sewer. Water booster pump in basement.
Domestic Hot Water System:
2 – 60 gal electric water tanks 4500 W - 1981
Water Fixtures:
2 toilets + 2 sinks high flow – 2nd floor, 1 toilet + sink for rink, 1 toilet + sink in basement
ELECTRICAL
Indoor Lighting:
Timer in rink lights, upstairs = six-4' x 2 fluorescent 34 W T12, three- incandescent 100 W , Main floor = 8' x 2 x 4 T12 – 60W, Rink: 2 x 8' T12 x 60
Outdoor Lighting:
1 incandescent light
Exit Signs:
2 – on second floor + 3 main floor: Incandescent.
Motors:
Parking Lot Plugs:
None
OTHER BUILDING SYSTEMS
Ice making machine (old), 2 compressors, 1 circ pump: 7.5 HP 220 V 22 amp motor, each compressor has 100 amp breaker, 3" brine lines to rink. Note. It appears the ice plant has an indoor and outdoor condenser. (to be confirmed)
PROCESS SYSTEMS
Outdoor condenser = 3 fan original, Carrier Model 09D6024540, Fan motors = 1 -208V 1ph 4.5 amps FLA ,0.4 hp, 2 – 208V 3ph 4.0 amps 1.01 hp.
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Only hydro in building.

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** September 19, 2005
Tour Personnel: Brian Salmon	**Construction Date:** Constructed 1995, Dwgs. available
Building: Fire Hall, 162 – 9th St.	**Renovations:**
L x W x H: 80' x 60' x 14' high / **Area:** 4800 SF	
Building Occupancy: 5	
Building Floor Plan: truck bay and office	**Occupied Times:** intermittent

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
6" metal frame, metal clad both sides R20
Roof Type/R-value:
6" fiberglass + 6" blown in = R20 + R20 = R40
Door Type/weather stripping:
Replace ped door stripping x 2. Vehicle doors are insulated and ok
Window type/caulking:
No windows
Other:
MECHANICAL
Heating System:
Electric unit heaters in shop, baseboards in office ceiling fans
Cooling System:
No A/C
Ventilation System:
No vehicle emissions monitoring. Wall exhaust fan c/w BDD, motorized intake damper in shop. Exhaust fan in office discharging to shop.
HVAC Controls:
Manual stat x 3 in shop set at 15°C + 1 in office at 15°C
HVAC Maintenance/Training:

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
No water
Domestic Hot Water System:
Electric 40 gal 3000 watt max marathon power smart CMHR 170230,
Water Fixtures:
Sink x 2 – low flow, clothes washing machine (1), fixtures good, shower x2 – low flow, kitchen sink, urinal x1, toilet high flow x2
ELECTRICAL
Indoor Lighting:
Fluorescent in office 18 x 2 bulbs (4'), shop 20 x 2 – 8' bulbs T12's
Outdoor Lighting:
See photos
Exit Signs:
None
Motors:
Parking Lot Plugs:
Not used
OTHER BUILDING SYSTEMS
Truck filling from hydrant inside building, No water meter, Clothes washer residential type
PROCESS SYSTEMS
N/A, Compressor 5HP 15 amp 208V
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro only

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle		**Date:** September 19, 2005
Tour Personnel: Plant Operator		**Construction Date:** Built 1960
Building: Sewage Lift Station – Generator Building 606 Kent Avenue		**Renovations:**
L x W x H: 4.6 m x 5.5m x 2.4m high	**Area:** 25 sm	
Building Occupancy: Capacity = 1		
Building Floor Plan: 1 Room housing generator		**Occupied Times:** intermittent for service

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
Wood frame 2 x 4 walls asbestos board liner inside, wood exterior
Roof Type/R-value:
Wood frame , metal clad roof, asbestos board ceiling
Door Type/weather stripping:
Old wood doors (2) no stripping 2 – (4' x 7')
Window type/caulking:
None
Other:
MECHANICAL
Heating System:
Electric baseboard
Cooling System:
No A/C
Ventilation System:
None
HVAC Controls:
Integral to baseboard
HVAC Maintenance/Training:

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
None
Domestic Hot Water System:
None
Water Fixtures:
None
ELECTRICAL
Indoor Lighting:
2 incandescent
Outdoor Lighting:
1 incandescent
Exit Signs:
None
Motors:
N/A
Parking Lot Plugs:
NA
OTHER BUILDING SYSTEMS
60 KW 75 KVA Diesel generator exhaust damper and return damper motorized, No intake damper, thermostatically controlled, back-up power for sewage pumps, Manually started
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro for building, diesel fuel for generator

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle		**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.		**Construction Date:** ????
Building: Sewage Pumping Station		**Renovations:**
Address: ??? Kent Street		
L x W x H: 5m x 5m x 3m (paced)	**Area:**	
Building Capacity:		
Building Floor Plan: Open interior		**Occupied Times:** Occupied periodically for servicing.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Exterior walls are 2 x 4 construction; walls have fibreglass batt insulation.
- Stucco exterior
- Plywood ceiling
- Asbestos Board interior walls

Roof Type/R-value:

- Framed roof, insulated, metal roof

Door Type/weather stripping:

- 1 – 36” metal insulated exterior door
- Weather stripping around exterior door; some gaps observed.

Window type/caulking:

- None

Other: Concrete Floor

MECHANICAL

Heating System:

- 1 – 8’ section of electric baseboard heat
- Temperature maintained above freezing in winter; approx. 10-15°C.
- Some heat most likely gained from sewage sump located directly beneath the floor of the building.

Cooling System:

- None

Ventilation System:

- Roof mounted wet well ventilation fan. No information observable at time of visit.
- 12”x12”; static louver; make-up air vent in wall.
- Ventilation fan only operated when building is occupied
- Estimated capacity – 2000 cfm

HVAC Controls:

- None

HVAC Maintenance/Training:

- None

Water Supply System:

- Wash water hose bib provided

Domestic Hot Water System:

- None

Water Fixtures:

- None

ELECTRICAL

Indoor Lighting:

- 2 – 300 W (???) ; Incandescent lighting fixtures; explosion proof

Outdoor Lighting:

- 1- high pressure sodium lamp

Exit Signs:

- None

Motors:

- See Process equipment

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Sewage Lift Pumps:

Motor:

- 1/3 hp; 1 phase; 115 V; 3450 rpm; 6 hz; 8A; S.F. max. amp 9.2; S.F. 1.75; Continuous duty

Pump:

- 2 – Flygt; 20 hp; submersible pumps Get information from drawings or other.
- Milltronics ultrasonic level controls

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- ????? A main power supply

NOTES

- Temperature in building maintained just above freezing in winter (10-15°C).
- 1 ½ mile; 8"; PVC forcemain to lagoon
- Wetwell depth approximately 20 ft.

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** May 15, 2005
Tour Personnel: Eleanor Dnistransky 842-3602	**Construction Date:** 1997 reconstructed.
Building: Resource Centre CDC Municipal Office + Fitness Club, 684 Main Street	**Renovations:** Building renovated completely – new roof, walls, and windows.
L x W x H: 98' x 48', 1 story See Drawing — **Area:** 4,700 SF	
Building Occupancy: 12	
Building Floor Plan: Offices	**Occupied Times:** Office: 40 hrs/wk; Fitness Center intermittent

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

Rebuilt on inside, exterior is original, block wall , Manitoba Hydro program to upgrade exterior walls, R-value unknown, 10-12" walls with 7" insulation.

Roof Type/R-value:

Roof upgraded ~ R40

Door Type/weather stripping:

2 glass doors in front, 2 metal doors in back. Weather strip to be repaired.

Window type/caulking:

2 pane see drawing, 2 broken windows in front (8' x 7') fitness center + office, windows not caulked under side. Re-caulk windows

Other:

Floor not upgraded

MECHANICAL

Heating System:

Forced air electric furnace (2). Each furnace and HRV serves ½ of the building (east and west) + electric baseboards, Nortron Furnace 1997 c/w economizer

Cooling System:

A/C on furnaces split system, energy efficient.

Ventilation System:

2 HRV's 250 cfm – installed in 2003 VanEE gold series, No damper on HRVs, 1 control in hallway, 1 in exercise area.

HVAC Controls:

HRV's 20 min on /40 min off all times for the office, exercise room on max continuous, stats in each room for base boards, no time clocks or set back stats. Notes: 1. West half = 1 furnace East half = 1 furnace, fitness center has its own HRV.

HVAC Maintenance/Training:

Maintenance contracted out, Train staff on stats. Filters cleaned every 4 months, dirty condensers outside.

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
No water meter
Domestic Hot Water System:
Electric HW tank Marathon Power Smart ~40 gal
Water Fixtures:
High flow sinks (2), 1 shower low flow, 3.5 gpf toilets (2), kitchen sink
ELECTRICAL
Indoor Lighting:
T8's?
Outdoor Lighting:
6 flood lights, 1 incandescent
Exit Signs:
1 incandescent
Motors:
N/A
Parking Lot Plugs:
~ 5 plugs no timers, few people plug in
OTHER BUILDING SYSTEMS
Ceiling fan in entrance
PROCESS SYSTEMS
N/A
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro only

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle		**Date:** September 19, 2005
Tour Personnel:		**Construction Date:** 1082
Building: Municipal Garage, 161 – 8th Street		**Renovations:**
L x W x H: 51' x 36' x 15' (high) excluding shed	**Area:** 1836 SF	Maintenance for Town vehicles and equipment.
Building Occupancy: 2		
Building Floor Plan: Vehicle maintenance, office		**Occupied Times:** 8 a.m. – 5 p.m. Monday – Friday

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
Metal frame – metal clad both sides 8" thick ~6" r-value
Roof Type/R-value:
Metal cladd (unknown r-value)
Door Type/weather stripping:
New vehicle doors (138" x 144" high) 1994, insulated. Replace weather stripping Gaps noted at ped door, replace weather stripping
Window type/caulking:
No windows
Other:
MECHANICAL
Heating System:
Electric unit heaters (2) in shop (18°C in winter) baseboard in office
Cooling System:
No A/C
Ventilation System:
Wall exhaust fans c/w BDD, manually controlled, no MUA, no vehicle exhaust, washroom exhaust on light switch
HVAC Controls:
Standard wall thermostat, no time clock, No setback, No CO sensors
HVAC Maintenance/Training:

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
No water meter
Domestic Hot Water System:
Electric water tank 170 liter 2-3.8 Kw
Water Fixtures:
1 sink and toilet (high flow type)
ELECTRICAL
Indoor Lighting:
T12 fluorescents – 26 – 8' bulbs in shop, 8 – 4' in office.
Outdoor Lighting:
1 – incandescent
Exit Signs:
None
Motors:
Parking Lot Plugs:
Nothing plugged in, vehicles stay inside
OTHER BUILDING SYSTEMS
Ceiling fans (3) run. Attached shed has no heat, vent or lights.
PROCESS SYSTEMS
Air compressor 15 amp 208V, welder 90 amp, ¼hp grinder, parts washer 120V 0.25A
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro Only

KGS GROUP

BUILDING INSPECTION INVENTORY

<table>
<tr><td colspan="2">Municipality: Birtle</td><td>Date: September 16, 2005</td></tr>
<tr><td colspan="2">Tour Personnel: Brenda Samchuk 842-5342, Charlene Smith 842-5350</td><td>Construction Date: Built 1902, Heritage Building</td></tr>
<tr><td colspan="2">Building: Birdtail Country Museum, 738 Main Street</td><td rowspan="3">Renovations:
Wall insulation not upgraded, some 6” fiberglass batt on basement walls, some metal cladding at back with wood. Roof replaced in 2003 with upgraded insulation.</td></tr>
<tr><td>L x W x H:
73’ x 24’ x 18’ high</td><td>Area: 3500 SF on
1st & 2nd floor</td></tr>
<tr><td colspan="2">Building Occupancy: 4 people</td></tr>
<tr><td colspan="2">Building Floor Plan: 2 story plus basement</td><td>Occupied Times: 1 p.m – 5 p.m Mon – Fri. = 20 hrs/week</td></tr>
</table>

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
Masonry covered with stucco or metal/ wood cladding, no insulation
Roof Type/R-value:
New metal roof with updated insulation 2 years ago
Door Type/weather stripping:
3 Old wood doors, damaged weather stripping.
Window type/caulking:
Main Floor: some new windows – 3 pane wood frame – need caulking, old type on front, 2 broken windows – 42” x 60” boarded up. Second Floor: 1 original window second floor on front face–, 2 pane upstairs wood frame 35” x 52’” x 6
Other:

MECHANICAL
Heating System:
Electric furnace 27 Kw + ½ hp blower newer, no air intake
Cooling System:
No A/C
Ventilation System:
Basement exhaust fan 5” discharge
HVAC Controls:
Blding kept at 50°F all the time. Wall thermostat old style
HVAC Maintenance/Training:
Furnace filter is clean

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
No meter
Domestic Hot Water System:
Electric water heater is old and disconnected
Water Fixtures:
Single sink + toilet high flow
ELECTRICAL
Indoor Lighting:
4' – fluorescent = (5 x 2), incandescent = 8 flood lights + 13 old heritage type lights, incandescent =6 – 60 W + 3 – 100 W, can be replaced (modern type)
Outdoor Lighting:
None
Exit Signs:
None
Motors:
N/A
Parking Lot Plugs:
None
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Notes
Gord Measies provided architectural renovations for roof. (call Provincial Government – heritage buildings for more info)

KGS GROUP

BUILDING INSPECTION INVENTORY

Municipality: Birtle	**Date:** September 16, 2005
Tour Personnel: Brian Salmon	**Construction Date:** Unknown, building is very old
Building: Recycling Depot – Office	**Renovations:** This is an old wood shack.
L x W x H: 12 x 16 x 8 / **Area:** 192 SF	
Building Occupancy: 1	
Building Floor Plan:	**Occupied Times:** 17 hrs/week total

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value:
2 x 4 wood construction
Roof Type/R-value:
2 x 6 assumed
Door Type/weather stripping:
1 man door very old, no weather stripping
Window type/caulking:
2' x 2' old leaky 2 pane x 2
Other:
MECHANICAL
Heating System:
1 – electric unit heater, integral stat
Cooling System:
None
Ventilation System:
None
HVAC Controls:
None
HVAC Maintenance/Training:
None

BUILDING INSPECTION INVENTORY
(CONTINUED)

Water Supply System:
None
Domestic Hot Water System:
None
Water Fixtures:
ELECTRICAL
Indoor Lighting:
1 – 100 W incandescent in office, 3 – 150 W incandescent in storage building
Outdoor Lighting:
1 – 100 W incandescent
Exit Signs:
None
Motors:
Parking Lot Plugs:
1 vehicle – 1 plug
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
Can crusher 9 hrs/week 5 hp 230 V 23 amp, Glass crusher 15 hrs/week ½ hp 120 V
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro only

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** 1900 (approx.)
Building: Tourist Information Building	**Renovations:** Building moved to site from original location. No significant renovations other than aesthetics (i.e. painting). Building is an old church.
Address: 147 Main Street	
L x W x H: 21 x 8 x 10 yd (paced) — **Area:** 1475 ft^2	
Building Capacity:	
Building Floor Plan: Front entrance area, main building area, storage area at rear.	**Occupied Times:** Building is occupied for various hours (12 hrs/day average) during summer months only. Tourist booth operational from May long weekend to September long weekend. Building is not used in Winter.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Wall construction is wood frame 2x4, asbestos siding.
- No insulation in walls, roof or under floors.
- Lath and plaster interior wall construction.
- West Storage area does not have interior walls and only lath and stucco construction for exterior wall.
- West entrance area is modern construction with insulated walls.

Roof Type/R-value:

- 2x4 wood construction, asphalt shingles, high peaked roof.
- No roof insulation.

Door Type/weather stripping:

- 1 – 32” metal insulated door on east side of building.
- 1 – 34” double insulated metal door set on West side entrance.

Window type/caulking:

- Arched, 90” high, 30” wide single pane. Vertical sliding sash. Windows appear original.
- 6 windows in total (3 on north side, 3 on south side.
- Windows boarded up during winter months.
- Additional window on west side of building in entrance area 40”x28” dual pane casement.

Other:

- Building was moved and placed on a 3 ft high pony wall assumed to be wood construction.
- Pony wall does not have insulation.
- No insulation in crawlspace area.

MECHANICAL

Heating System:

- Electric baseboard heating provided.
- 6 – 8’ sections, 3 kW baseboard units in main area of building.
- 2 – 3’ section baseboard units kW rating unknown) in west entrance area.
- 1 – 3’ section in washroom.
- No heating provided in East storage area.

Cooling System:

- 1440 kW, 12000 BTU/hr window air conditioning unit provided for summer operation.
- Used only as required in summer months.
- No heating provided to building in winter months

Ventilation System:

- Windows only for summer ventilation.

HVAC Controls:

- none

HVAC Maintenance/Training:

- Not applicable

Water Supply System:

- 700 igal in-ground cistern. ½ hp 60hz, single phase, 115 V “Slimmer” jet pump and tank for water supply.

Domestic Hot Water System:

- 10 igal, 1500W electric hot water tank for washroom supply. No name plate observed at time of visit.

Water Fixtures:

- 1 – sink
- 1 – toilet, standard flush.

ELECTRICAL

Indoor Lighting:

- 1 – 3 lamp incandescent fixture in washroom area. 60W bulbs
- 1 – 3 lamp incandescent vanity lighting above sink in washroom, wattage unknown
- 2 – 2 lamp incandescent fixtures in entrance area, wattage unknown
- 6 – single lamp incandescent hanging fixtures in main hall area, wattage unknown
- 2 – 300 W single lamp incandescent lights in storage area.

Outdoor Lighting:

- 2 – 100 W incandescent fixtures near double door entrance.

Exit Signs:

- None

Motors:

- 2 – ceiling fan units in main hall, wattage unknown.

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS
None

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
• 100 A main building service • Water usage estimated at approximately 1000 igal per year. Do not keep records other than amount of hauls • Gas use not applicable

NOTES
• No heating provided to building in Winter • Water system drained and blown out when closing the facility in fall of the year.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** 1960 (?), Extension built in 1986
Building: Water Treatment Plant	**Renovations:**
Address: 210 Centre Street	
L x W x H: 18 x 5 x 3 (paced) **Area:** 848 ft^2	
Building Capacity:	
Building Floor Plan: Essentially open throughout with older building section housing filters and newer building section housing raw water pumping and chemical feed containers.	**Occupied Times:** Occupied everyday for a minimum of 6 hours.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Exterior walls are 2 x 4 construction in filter area. Total square footage approximately ½ of total area. Siding on building exterior. Insulated walls.
- Exterior walls on pump area are 2 x 6 construction, insulated, exterior siding, plastic interior sheathing (puckboard?). Pump area encompasses approximately ½ the total square footage.

Roof Type/R-value:

- Framed roof, insulated, asphalt shingles, attic space provided.
- All openings to roof and attic areas insulated with pink rigid insulation.

Door Type/weather stripping:

- 1 – 32” metal insulated exterior door (older portion of building)
- Some gaps noted between door and frame
- 1 – 84” wide insulated overhead door (single garage type). Appears to be well sealed.

Window type/caulking:

- 1 – 26” x 42”, double pane PVC window
- 1 – 55” x 29”, double pane PVC window

Other:

MECHANICAL

Heating System:

- 2 – 240 V, 60 hz, 4000 W, coil type suspended unit heater; Manufacturer: Electromode
- 1 – 240 V, 60 hz, 4800W, coil type, suspended electric unit heater; Manufacturer: Dimplex North America
- building maintained at approximately 15°C during winter months.

Cooling System:

- None. Some cooling is achieved from process equipment

Ventilation System:

- Wall mounted ventilation fan with interior cowling.
- Hand on/of switch mounted on wall
- Used periodically for approximately 1 hour duration while regenerating media

HVAC Controls:

- None

HVAC Maintenance/Training:

- None

Water Supply System:

- None, domestic water is supplied from distribution line

Domestic Hot Water System:

- 1 – 3000W, 175 L electric water heater

Water Fixtures:

- 1 – Sample sink and faucets

ELECTRICAL

Indoor Lighting:

- 6 – 2 lamp fluorescent units. No other information observable.

Outdoor Lighting:

- 1 pot light installed in building fascia. Approximately 100W however actual wattage could not be observed.

Exit Signs:

- None

Motors:

- See Process equipment

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Raw Water Pump:

Motor:

- US Motor; 10 hp; 3 phase; 60 hz; Frame:256JPH; Volts 220/27.5A; Volt 440/13.75A; Type HJ NR; Design B; Code G; Upper bearing 1-3207J; Lower Bearing 1-7310 BY; 1750 rpm; Model R-1755-01-169; Serial # 1020020.

Pump:

- Layne 8 stage vertical turbine. No name plate or rating information observable

Filter Transfer Pumps:

- 2 pumps

Motor:

- Lincoln Electric ODP AC Motor; 15 hp; Frame 21J4; 3 phase; 60 hz; NEMA Code F; NEMA Design B; NEMA Nominal Efficiency 86.5%; continuous duty; 40°C; insulation class P

Pump:

- Peerless, end suction, centrifugal pump; Series C; Type C-815AH; Impeller 26841 83; Impeller diam. 7 1/8”; Design DB.

Chemical Feed Pumps:

Chlorine Feed Pump #1 (raw water):

- 2 – Alldos; 115V;50-60 hz; positive displacement pump; 1.902 gph @ 87 psi

Chlorine Feed Pump #2 (prior to filters):

- Prominent Model G4b; 115 V; 60 hz; 1.5 A peak; 24W; 2.5 L/hr @ 12 bar

Polymer Mixing:

Mixer Motor:

- Marathon ¼ hp; 1 phase; 115/208V; 1725 rpm; Service Factor 1; SFA Coe M; 40 °C; Continuous duty; Insulation B

Air Scour Blower:

- Roots type blower
- Baldor Motor; 2 hp; 1725 rpm; 3 phase; 60 hz; Cat # M3157T; Frame 145T; 230/460 V; 5.7/2.8 A; encl OPSB; Service Factor 1.15; Design B; Code K; NEMA Nom. Eff. 84%; PF 80%; rateing 40°C; ambient; continuous duty; serial # F400.

Water Metering:

- Rockwell International measuring imperial gallons
- Size ??????

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 200A main power supply
- 3 phase

NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** 1976
Building: Reservoir Building (above reservoir)	**Renovations:**
Address: 914 Lundy Street	
L x W x H: 4m x 4m (paced) — **Area:** 361 ft^2	
Building Capacity:	
Building Floor Plan: Open interior	**Occupied Times:** Occupied periodically for servicing.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: • Exterior walls are 2 x 4 construction; walls have fibreglass batt insulation. • Metal clad interior and exterior wall cladding
Roof Type/R-value: • Framed roof, insulated, metal clad
Door Type/weather stripping: • 1 – 36" metal insulated exterior door • Weather stripping around exterior door
Window type/caulking: • None
Other: Concrete Floor

MECHANICAL
Heating System: • Wall mounted electric heat; No other information observable • Temperature maintained above freezing in winter; approx. 10-15°C.
Cooling System: • None
Ventilation System: • None
HVAC Controls: • None
HVAC Maintenance/Training: • None
Water Supply System: • None
Domestic Hot Water System: • None
Water Fixtures:

- None

ELECTRICAL
Indoor Lighting: • 2 – 100 W; Incandescent lighting fixtures
Outdoor Lighting: • ??
Exit Signs: • None
Motors: • See Process equipment
Parking Lot Plugs: • None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS
Priming Pump: Motor: • 1/3 hp; 1 phase; 115 V; 3450 rpm; 6 hz; 8A; S.F. max. amp 9.2; S.F. 1.75; Continuous duty Pump: • Model # RL6B3D-SP

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
• 100 A main power supply

NOTES
• Temperature in building maintained just above freezing in winter (10-15°C).

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** 1976
Building: Reservoir Pumphouse	**Renovations:**
Address: 914 Lundy Street	
L x W x H: 5m x 5m (paced) — **Area:** 361 ft^2	
Building Capacity:	
Building Floor Plan: Open interior	**Occupied Times:** Occupied daily for sampling and servicing. Occupied approximately 1 hour per day.

ARCHITECHTURAL/STRUCTURAL

Wall type/R-value:

- Exterior walls are 2 x 4 construction; walls have fibreglass batt insulation.
- Metal clad interior and exterior wall cladding

Roof Type/R-value:

- Framed roof, insulated, metal clad

Door Type/weather stripping:

- 1 – 40” metal insulated exterior door
- Weather stripping around exterior door; gaps visible

Window type/caulking:

- 3 – 4’ x 1’ dual pane windows

Other: Concrete Floor

MECHANICAL

Heating System:

- 1 – coil type suspended electrical unit; no information observed;
- 1 – 4800 W; suspended unit heater; coil type; electric;
- Thermostat
- Temperature maintained above freezing in winter; approx. 10-15°C.

Cooling System:

- None

Ventilation System:

- 1 wall vent fan; hand on/off
- No equipment information observable

HVAC Controls:

- None

HVAC Maintenance/Training:

- None

Water Supply System:

- Internal domestic

Domestic Hot Water System:

- None

Water Fixtures:

- 1 – Sample Sink

ELECTRICAL

Indoor Lighting:

- 2 – 100 W; Incandescent lighting fixtures
- 1 – single lamp fluorescent unit above sample sink

Outdoor Lighting:

- ??

Exit Signs:

- None

Motors:

- See Process equipment

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Backup Pump:

Motor:

- 4 cylinder diesel; Wisconsin motor; Spec # 18557; Model C108HP4

Pump:

- Peerless; model F2-1240 AM 3F; Serial Number 419480; Impeller 2685586; Impeller Diameter 12”.

Distribution Pumps:

- Two distribution pumps provided

Distribution Pump #1 Motor:

- Baldor ; 7.5 hp; 3450 rpm; 3 phase; 200-230/460 V; 19-10/9 A; Cat. # JMM3219T; Spec. 36K78-94; Frame 184JM; Ser. MK06; Load Eff. 85%; P.F. 91%; 40°C; Continuous Duty.
- Variable speed drive

Distribution Pump #2 Motor:

- Lincoln Electric; 7.5 hp; 3480 rpm; 3 phase; 60 hz; 230/460 V; 19.9/10.0 A; Frame 184JM; S.F. 1.15; NEMA Code H; 208 V/20.8 A; NEMA Design B; Nom. Eff. 81.5; 40°C; Continuous Duty.

Distribution Pumps:

- Two pumps provided. Same Specifications
- Peerless; end suction; centrifugal; Type 515; Series C; Style M; Impeller Number V1788 B; Impeller diameter 5.8”.

Chemical Feed Pump:

- LMI Model C121-362S1; 120V; 3.5 A; 4 gph @ 100 psi.

Water Meter:

- 6” Rockwell International of Canada
- Imperial gallons

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
• 200 (???) A main power supply: CHECK MAIN POWER SUPPLY

NOTES
• No pressure tanks for pumps • Temperature in building maintained just above freezing in winter (10-15°C).

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** 1988
Building: North Hill Booster Station	**Renovations:**
Address:	
L x W x H: 5m x 4m (paced) / **Area:**	
Building Capacity:	
Building Floor Plan: Open interior with small separate room for electrical and controls	**Occupied Times:** Not occupied except when servicing.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: • Exterior walls are 2 x 4 construction; walls have fibreglas batt insulation. • Metal clad exterior and plywood clad interior
Roof Type/R-value: • Framed roof, insulated, metal roof cladding.
Door Type/weather stripping: • 1 – 32” metal insulated exterior door • Weather stripping around exterior door
Window type/caulking: • No windows in building
Other:
MECHANICAL
Heating System: • 2 – 8’ baseboard heat units; kW rating not available
Cooling System: • None
Ventilation System: • No ventilation provided
HVAC Controls: • None
HVAC Maintenance/Training: • None
Water Supply System: • None
Domestic Hot Water System: • None
Water Fixtures:

- None

ELECTRICAL

Indoor Lighting:

- Incandescent; two fixtures; 200 W bulbs.

Outdoor Lighting:

- ??

Exit Signs:

- None

Motors:

- See Process equipment

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Booster Pump:

Motor:

- 7 ½ hp; 3460 rpm; Frame 215; Serial # X144485; 60 hz; 208/220/440 V; 18.6/9.3 A; 40°C; continuous duty; Service Factor 1.15.
- Manufacturer unknown

Pump:

- End suction centrifugal; Name plate unreadable
- Pump operates 24/7

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 100 A main power supply

NOTES

- No pressure tanks for pumps
- No VFD’s for pumps
- Temperature in building maintained just above freezing in winter (10-15°C).
- No metering in booster station

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Town of Birtle	**Date:** September 15, 2005
Toured By: Tibor Takach, P.Eng.	**Construction Date:** Estimated 1960s
Building: South Hill Booster Station	**Renovations:**
Address:	
L x W x H: 5m x 4m (approx) **Area:**	
Building Capacity:	
Building Floor Plan: Open interior with small separate room for electrical and controls	**Occupied Times:** Not occupied except when servicing.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: • Exterior walls are 2 x 4 construction; walls have fibreglass batt insulation. • Asbestos board interior walls • Wood exterior siding
Roof Type/R-value: • Framed roof, insulated, Asphalt roof cladding.
Door Type/weather stripping: • 1 – 32” metal insulated exterior door • Weather stripping around exterior door; gaps visible
Window type/caulking: • No windows in building
Other:
MECHANICAL
Heating System: • 2 – 4800 kW construction heaters; • Interior maintained above freezing (10-15°C) in Winter
Cooling System: • None
Ventilation System: • No ventilation provided
HVAC Controls: • None
HVAC Maintenance/Training: • None
Water Supply System: • None
Domestic Hot Water System:

- None

Water Fixtures:

- None

ELECTRICAL

Indoor Lighting:

- Incandescent; two fixtures; 200 W bulbs.

Outdoor Lighting:

- ??

Exit Signs:

- None

Motors:

- See Process equipment

Parking Lot Plugs:

- None

OTHER BUILDING SYSTEMS

PROCESS SYSTEMS

Booster Pump:

Motor:

- Baldor; 7 ½ hp; 3450 rpm; Frame 184T; 208V; Spec 36A01W385

Pump:

- Peerless; end suction; centrifugal; Type 610 A; Design DB; Impeller 2683848; Impeller diameter 6".

BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)

- 100 A main power supply

NOTES

- No pressure tanks for pumps
- No VFD's for pumps
- Temperature in building maintained just above freezing in winter (10-15°C).
- No metering in booster station

APPENDIX B

TABLES TO CALCULATE ENERGY SAVINGS

TABLE OF CONTENTS – APPENDIX B

Table B.1.1 Annual Energy Consumption for Community Centre

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	239,514	61%
HVAC	86,359	22%
Hot Water	21,222	5%
Lighting	44,071	11%
Total	**391,166**	

Table B.1.2 - Electricity Usage for Community Centre

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
September	0	0	3,661	$0	$215	$278
October	0	0	4,000	$0	$234	$292
November	128	78	58,461	$649	$1,886	$2,940
December	144	94	64,800	$782	$2,035	$3,236
January	144	94	53,661	$782	$1,774	$2,963
February	152	102	57,261	$849	$1,858	$3,122
March	152	102	54,861	$849	$1,802	$3,058
April	160	110	56,861	$915	$1,849	$3,196
May	20	0	14,400	$0	$796	$933
June	0	0	9,200	$0	$552	$655
July	40	0	9,600	$0	$576	$682
August	0	0	4,400	$0	$264	$326
TOTALS		**580**	**391,166**	**$4,826**	**$13,842**	**$21,681**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Community Centre is charged based on the General Service Small, Three Phase Manitoba Hydro rates.

Table B.1.3 - Lighting Analysis Summary for Community Centre

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Reception Fluorescents - Convert 8' T12s to 8' T8s (24x2)	48	10,022	$602	4,666	$280
Rink Metal Halides	21	22,680	$1,362	22,680	$1,362
Service Area Incandescents - Convert Incandescents to Compact Fluorescents	6	1,620	$97	432	$26
Basement Fluorescents - Convert 8' T12s to 8' T8s (19x1)	19	3,967	$238	1,847	$111
Outdoor Incandescents - Convert to High Pressure Sodium	4	2,628	$158	1,314	$79
Exit Signs - Convert Incandescents to LEDs	12	3,154	$189	315	$19
TOTALS		**44,071**	**$2,646**	**31,254**	**$1,876**

Annual Energy Savings (kWh)	**12,817**
Annual Cost Savings	**$770**
Percent Annual Energy Savings	**29%**

These calculations are assuming that the community centre is occupied 6 months of the year,10 hours per day (1800 hours per year)

The Exit signs are assumed to be on 24 hours a day, 365 days per year

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.1.4 (a) Window and Door Replacement Calculations for Community Centre

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace wood vehicle door with an insulated wood vehicle door	138	1.578	6,716	$403	6.67	245	$15	6,471	$389
TOTALS			**6,716**	**$403**		**245**	**$15**	**6,471**	**$389**

Table B.1.4 (b) Window and Door Infiltration Calculations for Community Centre

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Wood Vehicle Door (1)	23.5	0.05	125	80	3,497,308	1,025	$62
Glass Doors to Enter Reception (2)	20	0.05	125	68	19,328,078	5,665	$340
Metal Doors to Exit Rink (4)	38.67	0.05	125	132	5,754,436	1,686	$101
Metal Doors to Exit Reception (2)	19.33	0.05	125	66	18,683,809	5,476	$329
TOTALS						**13,852**	**$832**

Table B.1.4 (c) Upgrade Wall/Roof Insulation for Community Centre

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade Wall Insulation Between Rink and Reception	800	8.000	12,580	$755	20	5,032	$302	7,548	$453
TOTALS			**12,580**	**$755**		**5,032**	**$302**	**7,548**	**$453**

The glass doors are assumed to be 3' x 7'
The metal doors are assumed to be 32" x 84"
The reception area is assumed to be kept at 70 F and the rink at 21 F
The crack lengths are taken as half the perimeter of the doors

Table B.1.5 - Water Usage for Community Centre

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	4	5.8	41,616	1.60	66,586	0.32	13,317	53,268	1,996	$120
Toilets	3	2.5	13,500	13.25	178,875	6.00	81,000	97,875	NA	NA
Urinals	2	6.6	23,625	Auto	496,692	3.80	89,775	406,917	NA	NA
Basement Changerooms										
Showers	3	0.7	3,591	66.25	237,886	47.30	169,854	68,031	2,549	$153
Leaking Shower	1	Leaking	Leaking	0.1 gpm	199,728	0.00	0	199,728	7,485	$449
Toilets	1	2.5	4,500	13.25	59,625	6.00	27,000	32,625	NA	NA
Total					**1,239,391**		**380,946**	**858,445**	**12,030**	**$722**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	15	35	
Number of Toilet Uses/day	3	1	
Number of Toilets	4	4	
Toilet Uses/hour/fixture	1.40625	1.09375	2.5
Number of Urinals	-	2	
Number of Urinal Uses/day	-	3	
Urinal Uses/hr/fixture	-	6.5625	6.5625
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	1.40625	4.375	5.78125

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	66,586	2,495
Showers	237,886	8,915
Leaky Shower	199,728	7,485
Total		**18,894**

The automatic flush urinals are assumed to consume 5 gallons every 5 minutes = 3.785 L/min
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush
The current showers are assumed to use 3.5 gpm and the new showers use 2.5 gpm
The leaking shower drips approximately 20 drops per second which is equivalent to 0.1 gpm

Table B.1.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Community Centre

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 70 F	Heating Efficiency	Energy Savings (kWh)
Install motorized damper on greasehood make up air duct	1	200	10915.92	100%	16,580

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	71.23%	10915.92	9267.12	86,359	6,504

Table B.1.7 Energy Consumption and Savings Calculations for Motors in Community Centre

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Compressor 1	75	60	2,206	70.56	52.62	116,072	1.44	1.07	2,369
Compressor 2	75	60	1,047	70.56	52.62	55,090	1.44	1.07	1,124
Brine Pump	20	16	4,320	18.82	14.03	60,614	0.32	0.24	1,031
Condenser Fan 1	5	4	552	4.70	3.51	1,935	0.12	0.09	49
Condenser Fan 2	5	4	552	4.70	3.51	1,935	0.12	0.09	49
Condenser Fan 3	5	4	552	4.70	3.51	1,935	0.12	0.09	49
Condenser Fan 4	5	4	552	4.70	3.51	1,935	0.12	0.09	49
TOTALS						**239,514**			**4,721**

Table B.2.1 Annual Energy Consumption for Community Hall

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	62,713	86%
Hot Water	2,155	3%
Lighting	8,092	11%
Total	**72,960**	

Table B.2.2 - Electricity Usage for Community Hall

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	14	0	2,000	$0	$117	$152
October	43	0	4,480	$0	$263	$317
November	38	0	6,960	$0	$408	$483
December	46	0	9,520	$0	$558	$654
January-05	45	0	16,800	$0	$870	$1,009
February	67	17	10,800	$141	$633	$901
March	48	0	9,760	$0	$572	$670
April	46	0	5,440	$0	$319	$389
May	41	0	3,360	$0	$202	$248
June	34	0	1,920	$0	$115	$149
July	30	0	880	$0	$53	$78
August	21	0	1,040	$0	$62	$89
TOTALS		**17**	**72,960**	**$141**	**$4,171**	**$5,139**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Community Hall is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.2.3 - Lighting Analysis Summary for Community Hall

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Main Floor Fluorescents - Convert 4' T12s to 4' T8s (24x4)	96	1,185	$71	714	$43
Main Floor Exit Signs - Convert Incandescents to LEDs	4	1,051	$63	105	$6
Basement Fluorescents - Convert 8' T12s to 8' T8s (20x2)	40	1,169	$70	544	$33
Basement Exit Signs - Convert Incandescents to LEDs	2	526	$32	53	$3
Outdoor Incandescents - Convert to High Pressure Sodium	2	876	$53	438	$26
Outdoor HPS	3	3,285	$197	3,285	$197
TOTALS		**8,092**	**$486**	**5,139**	**$309**

Annual Energy Savings (kWh)	**2,954**
Annual Cost Savings	**$177**
Percent Annual Energy Savings	**37%**

These calculations are assuming that the hall is occupied 3 hours per week for bingo and 8 hours per month for socials (252 hours per year).

The Exit signs are assumed to be on 24 hours a day, 365 days per year

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.2.4 (a) Window and Door Replacement Calculations for Community Hall

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace old single wood doors to outside with insulated wood doors (2)	42	1.578	2,044	$123	6.67	483	$29	1,561	$94
Replace old double wood doors with insulated wood doors (1)	42	1.578	2,044	$123	6.67	483	$29	1,561	$94
TOTALS			**4,088**	**$245**		**967**	**$58**	**3,121**	**$187**

Table B.2.4 (b) Window and Door Infiltration Calculations for Community Hall

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Old Single Wood Doors to Outside (2)	10	0.05	125	34	9,664,039	2,832	$170
Single Wood Doors to Outside (2)	10	0.05	125	34	9,664,039	2,832	$170
Double Doors in Front (1)	6.5	0.05	125	22	6,281,625	1,841	$111
Old Double Wood Doors (1)	6.5	0.05	125	22	6,281,625	1,841	$111
TOTALS						**9,346**	**$561**

The wood doors to outside are taken as 3' x 7' and the double wood doors are 6'x7'

The current thermal conductivity of both doors is taken as 0.16 W/mK and the thickness is assumed 1.75"

The crack length is taken as a quarter of the perimeter of the doors

The temperature of the community hall is assumed to be 70 F

Table B.2.5 - Water Usage for Community Hall

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	2	16	8,266	1.60	13,225	0.32	2,645	10,580	396	$24
Toilets	4	5	4,725	13.25	62,606	6.00	28,350	34,256	NA	
Basement Washroom										
Urinals	2	14	7,088	9.50	67,331	3.80	26,933	40,399	NA	
Sinks	2	16	8,266	1.60	13,225	0.32	2,645	10,580	396	$24
Toilets	4	5	4,725	13.25	62,606	6.00	28,350	34,256	NA	
Total					**218,994**		**88,922**	**130,071**	**396**	**$48**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	75	75	
Number of Toilet Uses/day	3	1	
Number of Toilets	8	8	
Toilet Uses/hour/fixture	3.52	1.17	4.69
Number of Urinals	-	2	
Number of Urinal Uses/day	-	3	
Urinal Uses/hr/fixture	-	14.06	14.06
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	7.03	9.38	16.41

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sink 1	13,225	496
Sink 2	13,225	496
Total		**991**

The urinals are assumed to consume 2.5 gallons per flush and the new urinals consume 1 gpf

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.2.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Community Hall

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	97.12%	10915.92	9267.12	62,713	6,440

Table B.3.1 Annual Energy Consumption for Curling Club

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	79,939	63%
HVAC	34,667	27%
Hot Water	3,236	3%
Lighting	9,022	7%
Totals	**126,864**	

Table B.3.2 - Electricity Usage for Curling Club

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	10	0	402	$0	$24	$59
October	58	8	6,162	$67	$361	$519
November	60	10	17,322	$83	$890	$1,142
December	60	10	16,002	$83	$839	$1,084
January-05	60	10	20,922	$83	$1,008	$1,278
February	55	5	13,962	$42	$760	$947
March	55	5	28,722	$42	$1,191	$1,439
April	24	0	19,122	$0	$959	$81
May	7	0	1,482	$0	$89	$81
June	2	0	1,122	$0	$67	$99
July	0	0	1,002	$0	$60	$91
August	17	0	642	$0	$39	$66
TOTALS		**48**	**126,864**	**$399**	**$6,287**	**$6,886**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Curling Club is charged based on the General Service Small, Three Phase Manitoba Hydro rates.

Table B.3.3 - Lighting Analysis Summary for Curling Club

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Main Floor Fluorescents - Convert 8' T12s to 8' T8s (4x2)	8	429	$26	200	$12
Main Floor Exit Signs - Convert Incandescents to LEDs	3	788	$47	79	$5
Main Floor Rink Fluorescents - Convert 8' T12s to 8' T8s (60x2)	120	6,431	$386	2,994	$180
Upstairs Incandescents - Convert to Compact Fluorescents	3	139	$8	36	$2
Upstairs Fluorescents - Convert 4' T12s to 4' T8s (6x2)	12	272	$16	164	$10
Upstairs Exit Signs - Convert Incandescents to LEDs	2	526	$32	53	$3
Outdoor Incandescents - Convert to Compact High Pressure Sodium Lights	1	438	$26	219	$13
TOTALS		**9,022**	**$542**	**3,743**	**$225**

Annual Energy Savings (kWh)	**5,279**
Annual Cost Savings	**$317**
Percent Annual Energy Savings	**59%**

These calculations are assuming that the curling rink is occupied throughout the winter for 6 hours, 3 nights of the week (462 hours/year).

The Exit signs are assumed to be on 24 hours a day, 365 days per year.

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.3.4 (a) Window and Door Replacement Calculations for Curling Club

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace inside 3'x7' doors to rink with insulated doors (2)	42	1.578	1,281	$77	6.67	303	$18	978	$59
Replace outdoor 3'x2' aluminum sliders with triple pane windows (4)	24	2.000	921	$55	6.25	295	$18	627	$38
Replace upstairs 12'x4' indoor windows to rink with triple pane windows (3)	144	2.000	3,464	$208	6.25	1,108	$67	2,355	$141
Replace main floor 12'x4' indoor windows to rink with triple pane windows (3)	144	2.000	3,464	$208	6.25	1,108	$67	2,355	$141
Replace main floor 4'x4' indoor windows to rink with triple pane windows (2)	32	2.000	770	$46	6.25	246	$15	523	$31
TOTALS			**9,900**	**$594**		**3,061**	**$184**	**6,839**	**$411**

Table B.3.4 (b) Window and Door Infiltration Calculations for Curling Club

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Insulated Steel Door (3)	15	0.05	125	51	14,496,058	4,248	$255
Windows to Outside (4)	5	0.025	50	7	1,211,112	355	$21
TOTALS					**14,496,058**	**4,603**	**$276**

The temperature of the rink is assumed to be 32 F and the temperature of the reception area is assumed to be kept at 70 F

The crack lengths are taken as a quarter of the perimeters

The R values of the current windows are taken as 2.0, the thermal conductivity of the wood doors is taken as 0.16.

Table B.3.5 - Water Usage for Curling Club

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor										
Sinks	1	8	3,790	1.60	6,064	0.32	1,213	4,851	182	$11
Toilets	1	8	3,790	13.25	50,215	6.00	22,739	27,476	NA	
Basement										
Sinks	1	8	3,790	1.60	6,064	0.32	1,213	4,851	182	$11
Toilets	1	8	3,790	13.25	50,215	6.00	22,739	27,476	NA	
2nd Floor										
Sinks	2	8	7,580	1.60	12,127	0.32	2,425	9,702	364	$22
Toilets	2	8	7,580	13.25	100,429	6.00	45,477	54,952	NA	
Totals					**225,113**		**50,328**	**129,307**	**727**	**$44**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	37.5	37.5	
Number of Toilet Uses/day	3	4	
Number of Toilets	4	4	
Toilet Uses/hour/fixture	3.52	4.69	8.20
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	3.52	4.69	8.20

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks 1	6,064	227
Sinks 2	6,064	227
Sinks 3	12,127	454
Total		**909**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.3.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Curling Club

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 32 F	Heating Efficiency	Energy Savings (kWh)
Install motorized damper on intakes	2	200	3,277	100%	9,955

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	75.34%	10915.92	9267.12	34,667	2,762

Table B.3.7 Energy Consumption and Savings Calculations for Motors in Culing Club

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings with Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Compressor 1	25.0	20.0	2,206	23.52	17.54	38,691	0.56	0.42	921
Compressor 2	25.0	20.0	1,047	23.52	17.54	18,363	0.56	0.42	437
Brine Pump	7.5	6.0	4,320	7.06	5.26	22,730	0.19	0.14	619
Condenser Fan 1	0.4	0.3	552	0.38	0.28	155	0.00	0.00	0
Condenser Fan 2	1.0	0.8	552	0.95	0.71	391	0.00	0.00	0
Condenser Fan 3	1.0	0.8	552	0.95	0.71	391	0.00	0.00	0
TOTAL						**79,939**			**1,977**

Table B.4.1 Annual Energy Consumption for Fire Hall

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	37,608	87%
Hot Water	2,082	5%
Lighting	3,330	8%
Totals	**43,020**	

Table B.4.2 - Electricity Usage for Fire Hall

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	1,500	$0	$88	$118
October	0	0	840	$0	$49	$74
November	0	0	3,660	$0	$214	$262
December	0	0	8,160	$0	$478	$563
January-05	0	0	6,780	$0	$397	$471
February	0	0	7,320	$0	$429	$507
March	0	0	5,400	$0	$316	$379
April	0	0	4,080	$0	$245	$296
May	0	0	2,460	$0	$148	$186
June	0	0	1,500	$0	$90	$121
July	0	0	780	$0	$47	$71
August	0	0	540	$0	$32	$55
TOTALS		**0**	**43,020**	**$0**	**$2,534**	**$3,104**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Fire Hall is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.4.3 - Lighting Analysis Summary for Fire Hall

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Office Fluorescents - Convert 4' T12s to 4' T8s (18x2)	36	917	$55	552	$33
Shop Fluorescents - Convert 8' T12s to 8' T8s (20x2)	40	2,413	$145	1,123	$67
TOTALS		**3,330**	**$200**	**1,675**	**$101**

Annual Energy Savings (KWH)	**1,655**
Annual Cost Savings	**$99**
Percent Annual Energy Savings	**50%**

These calculations are assuming that the fire hall is occupied 10 hours per week (520 hours/year)

Table B.4.4 Window and Door Infiltration Calculations for Fire Hall

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Pedestrian doors (2)	10	0.05	125	34	9,664,039	2,832	$170
TOTAL						**2,832**	**$170**

The temperature of the fire hall is assumed to be kept at 70 F

The size of the pedestrian doors is taken as 3'x7' and the crack length is taken as a quarter of the perimeter

Table B.4.5 - Water Usage for Fire Hall

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Washroom 1										
Sink	1	1.19	618	1.60	988	0.32	198	790	30	$2
Toilet	1	0.44	229	13.25	3,032	6.00	1,373	1,659	NA	NA
Urinal	1	1.50	780	9.50	7,410	3.80	2,964	4,446	NA	NA
Shower	1	0.31	163	66.25	10,766	47.32	7,690	3,076	115	$7
Washroom 2										
Sink	1	1.19	618	1.60	1,976	0.32	198	1,778	67	$4
Toilet	1	0.44	228	13.25	3,014	6.00	1,365	1,649	NA	NA
Shower	1	0.31	163	66.25	10,766	47.32	7,690	3,076	115	$7
Totals					**37,951**		**21,476**	**16,475**	**327**	**$20**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	1	4	
Number of Toilet Uses/day	3	1	
Number of Toilets	2	2	
Toilet Uses/hour/fixture	0.19	0.25	0.44
Number of Urinals	-	1	
Number of Urinal Uses/day	-	3	
Urinal Uses/hr/fixture	-	1.5	1.5
Number of Sinks	2	2	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.19	1.00	1.19

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sink 1	988	37
Shower 1	10,766	403
Sink 2	1976	74
Shower 2	10,766	403
Total		**918**

The current urinals are assumed to use 2.5 gallons per flush and the new urinals consume 1.0 gallons per flush
The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm
The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush
The current showers are assumed to use 3.5 gpm and the new showers use 2.5 gpm (5 minutes/shower)

Table B.4.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Fire Hall

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	94.06%	10915.92	9267.12	37,608	3,740

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 70 F	Heating Efficiency	Energy Savings (kWh)
Replace exhaust fan BDD with motorized damper.	1	1000	10915.92	100%	8,290
Provide vehicle emissions monitoring control of ventilation.	1	1000	10915.92	100%	9,948

Table B.5.1 Annual Energy Consumption for Sewage Lift Station/Generator Building

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	37,819	71%
HVAC	13,975	26%
Lighting	1,846	3%
Totals	**53,640**	

Table B.5.2 - Electricity Usage for Sewage Lift Station/Generator Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	2,220	$0	$130	$173
October	0	0	2,700	$0	$158	$205
November	0	0	3,840	$0	$225	$281
December	0	0	5,160	$0	$302	$370
January-05	0	0	7,320	$0	$429	$514
February	0	0	5,160	$0	$302	$370
March	0	0	5,340	$0	$313	$382
April	0	0	5,760	$0	$346	$417
May	0	0	2,880	$0	$173	$222
June	0	0	5,100	$0	$306	$374
July	0	0	1,440	$0	$86	$124
August	0	0	6,720	$0	$403	$485
TOTALS		**0**	**53,640**	**$0**	**$3,175**	**$3,917**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Sewage Lift Station is charged based on the General Service Small, Three Phase Manitoba Hydro rates.

Table B.5.3 - Lighting Analysis Summary for Sewage Lift Station/Generator Building

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Generator Building Indoor Incandescents - Convert to Compact Fluorescents	2	31	$2	8	$0
Generator Building Outdoor Incandescents - Convert to Compact Fluorescents	1	657	$39	140	$8
Pumping Station Indoor Incandescents - Convert to Compact Fluorescents	2	62	$4	16	$1
Pumping Station Outdoor High Pressure Sodium Lamp	1	1,095	$66	1,095	$66
TOTALS		**1,846**	**$111**	**1,260**	**$76**

Annual Energy Savings (KWH)	**586**
Annual Cost Savings	**$35**
Percent Annual Energy Savings	**32%**

These calculations are assuming that the Sewage Lift Station is occupied 2 hours per week

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.5.4 (a) Window and Door Replacement Calculations for Sewage Lift Station/Generator Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace Generator Building 4'x7' wood doors to outside with insulated doors (2)	56	1.578	2,314	$139	6.67	547	$33	1,766	$106
TOTALS			**2,314**	**$139**		**547**	**$33**	**1,766**	**$106**

Table B.5.4 (b) Window and Door Infiltration Calculations for Sewage Lift Station/Generator Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Generator Building Wood Doors to Outside - 4'x7' (2)	11	0.05	125	38	9,024,763	2,645	$159
Pumping Station Wood Doors to Outside 3'x7' (1)	5	0.05	125	17	4,102,165	1,202	$72
TOTALS						**3,847**	**$231**

Table B.5.4 (c) Upgrade Wall/Roof Insulation for Sewage Lift Station/Generator Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace R12 with R20	1290	12	7,007	$421	20	4,204	$252	2,803	$168
TOTALS			**7,007**	**$421**		**4,204**	**$252**	**2,803**	**$168**

The Sewage Lift Station and Generator Building are assumed to be kept at 59 F

The doors are assumed to be 3'x7' and the crack length is taken as a quarter of the perimeter.

The thermal conductivity of the door is taken as 0.16 W/mK

Table B.5.5 Energy Savings with Heating, Ventilating, and Air Conditioning for Sewage Lift Station/Generator Building

Description	% of Time Unoccupied	Heating Degree Days below 59 F	Heating Degree Days below 50 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 50 F	100%	9267.12	6,615.36	13,975	3,999

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2 hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2 hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace outside ventilation damper with insulated damper.	6	1.000	391	$23	3	130	$8	261	$16

Table B.5.6 Energy Consumption and Savings Calculations for Motors in Sewage Lift Station/Generator Building

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Submersible Flygt Pump 1	20	16	1,348	18.82	14.03	18,910	0.45	0.33	450
Submersible Flygt Pump 1	20	16	1,348	18.82	14.03	18,910	0.45	0.33	450
TOTALS						**37,819**			**900**

Table B.6.1 Annual Energy Consumption for Resource Centre CDC & Municipal Offices

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	58,609	82%
Hot Water	2,334	3%
Lighting	10,656	15%
Total	**71,600**	

Table B.6.2 - Electricity Usage for Resource Centre CDC & Municipal Offices

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	4,240	$0	$248	$301
October	0	0	4,160	$0	$244	$296
November	0	0	6,080	$0	$356	$424
December	0	0	6,720	$0	$394	$467
January-05	0	0	11,280	$0	$657	$767
February	0	0	6,880	$0	$403	$478
March	0	0	6,720	$0	$394	$467
April	0	0	4,640	$0	$279	$334
May	0	0	5,040	$0	$303	$363
June	0	0	4,800	$0	$288	$347
July	0	0	6,800	$0	$408	$484
August	0	0	4,240	$0	$255	$308
TOTALS		**0**	**71,600**	**$0**	**$4,229**	**$5,035**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Resource Centre is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.6.3 - Lighting Analysis Summary for Resource Centre CDC & Municipal Offices

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Fluorescent T8s	56	3,727	$224	3,727	$224
Exit Signs - Convert Incandescents to LEDs	1	263	$16	26	$2
Outdoor Incandescents - Convert to High Pressure Sodium Lights	1	438	$26	219	$13
Outdoor Flood Lights - Convert to High Pressure Sodium Lights	6	2,628	$158	1,314	$79
Install Parking Lot Controllers	5	3,600	$216	1,800	$108
TOTALS		**10,656**	**$640**	**7,087**	**$425**

Annual Energy Savings (kWh)	**3,570**
Annual Cost Savings	**$214**
Percent Annual Energy Savings	**33%**

The Exit signs are assumed to be on 24 hours a day, 365 days per year

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

The indoor lights are on for 40 hours per week year round

Table B.6.4 (a) Window and Door Replacement Calculations for Resource Centre CDC & Municipal Offices

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace 3'x7' broken windows in front (2)	42	1.000	3,225	$194	6.25	516	$31	2,709	$163
TOTALS			**3,225**	**$194**		**516**	**$31**	**2,709**	**$163**

Table B.6.4 (b) Window and Door Infiltration Calculations for Resource Centre CDC & Municipal Offices

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Metal Doors (2)	10	0.05	125	34	9,664,039	2,832	$170
Glass Doors (1)	5	0.05	125	17	4,832,019	1,416	$85
Windows in Front - 8'x7' (4)	30	0.025	50	41	11,596,847	3,399	$204
Windows in Front - 3'x7' (2)	10	0.025	50	14	3,865,616	1,133	$68
TOTALS						**8,780**	**$527**

The R value for the broken windows is taken as 1.0

The crack lengths are taken as a quarter of the perimeter

The doors are assumed to be 3'x7'

Table B.6.5 - Water Usage for Resource Centre CDC & Municipal Offices

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	2	2.6	10,920	1.60	17,472	0.32	3,494	13,978	524	$31
Toilets	2	2.6	10,920	13.25	144,690	6.00	65,520	79,170	NA	NA
Showers	1	0.1	208	66.20	13,770	47.32	9,842	3,928	147	$9
Totals					**175,932**		**78,856**	**97,075**	**671**	**$40**

Frequency at Which Fixtures are Used			
	Females	Males	Totals
Number of People	6	6	
Number of Uses/day	3	4	
Number of Toilets	2	2	
Toilet Uses/hr/Fixture	1.125	1.5	2.625

Current Hot Water Usage (kWh)		
Fixture	L/Yr	kWh
Sinks	17,472	655
Shower	13,770	516
Total		**1,171**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current water closets are assumed to use 3.5 gallons per flush and the new wash closets use 1.5 gallons per flush

The current showers are assumed to use 3.5 gpm and the new showers use 2.5 gpm

Table B.6.6 Energy Savings with Heating, Ventilating, and Air Conditioning for the Resource Centre CDC & Municipal Offices

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 70 F	Heating Efficiency	Energy Savings (kWh)
Install motorized damper on HRV intakes	2	125	10915.92	100%	10,363

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	76.26%	10915.92	9267.12	44,609	5,138

Table B.7.1 Annual Energy Consumption for Municipal Garage

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	43,425	83%
Hot Water	1,288	2%
Lighting	7,527	14%
Total	**52,240**	

Table B.7.2 - Electricity Usage for Municipal Garage

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	1,540	$0	$90	$121
October	0	0	2,470	$0	$145	$183
November	0	0	4,560	$0	$267	$323
December	0	0	8,320	$0	$488	$574
January-05	0	0	9,040	$0	$530	$622
February	0	0	9,940	$0	$582	$682
March	0	0	7,080	$0	$415	$491
April	0	0	4,190	$0	$252	$303
May	0	0	2,820	$0	$169	$211
June	0	0	640	$0	$38	$62
July	0	0	390	$0	$23	$45
August	0	0	1,250	$0	$75	$104
TOTAL		**0**	**52,240**	**$0**	**$3,075**	**$3,720**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Municipal Garage is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.7.3 - Lighting Analysis Summary for Municipal Garage

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Shop Fluorescents - Convert 8' T12s to 8' T8s (13x2)	26	6,273	$377	2,920	$175
Office Fluorescents - Convert 4' T12s to 4' T8s (4x2)	8	815	$49	491	$29
Outdoor Incandescents - Convert to High Pressure Sodium	1	438	$26	219	$13
TOTALS		**7,527**	**$452**	**3,630**	**$218**

Annual Energy Savings (kWh)	**3,896**
Annual Cost Savings	**$234**
Percent Annual Energy Savings	**52%**

These calculations are assuming that the Municipal Garage is occupied 40 hours per week

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.7.4 Window and Door Infiltration Calculations for Municipal Garage

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Wood Vehicle Door (3)	35.25	0.05	125	120	34,065,737	9,984	$599
Pedestrian Doors (3)	15	0.05	125	51	14,496,058	4,248	$255
TOTALS						**14,232**	**$854**

The vehicle door is assumed to be 11.5' x 12' and the pedestrian doors are 3'x7'

The crack lengths are taken as a quarter of the perimeter of the doors

The temperature of the garage is assumed to be kept at 70 F

Table B.7.5 - Water Usage for Municipal Garage

	Qty	Est. # of Uses/Hr/Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	1	1	2,080	1.60	3,328	0.32	666	2,662	100	$6
Toilets	1	1	2,080	13.25	27,560	6.00	12,480	15,080		
Total					**30,888**		**13,146**	**17,742**	**100**	$6

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	0	2	
Number of Uses/day	3	4	
Number of Toilets	1	1	
Toilet Usage/hour/fixture	0	1.00	1
Number of Sinks	1	1	
Sink Uses/hour/fixture	0	1.00	1

Current Hot Water Consumption		
	L/Yr	**kWh**
Sinks	3,328	125
Totals	**3,328**	**125**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.7.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Municipal Garage

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 70 F	Heating Efficiency	Energy Savings (kWh)
Install motorized damper on exhaust.	1	20	10915.92	100%	1,658
Provide vehicle emissions monitoring control of ventilation systems.	1	1000	10915.92	100%	9,948

Description	% of Time Unoccupied	Heating Degree Days below 70 F	Heating Degree Days below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 59 F	76.26%	10915.92	9267.12	43,425	3,501

Table B.8.1 Annual Energy Consumption for Birdtail Country Museum

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	30,191	90.0%
Hot Water	109	0.3%
Lighting	3,240	9.7%
Totals	**33,540**	

Table B.8.2 - Electricity Usage for Birdtail Country Museum

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	780	$0	$46	$70
October	0	0	1,970	$0	$115	$150
November	0	0	2,530	$0	$148	$187
December	0	0	4,520	$0	$265	$320
January-05	0	0	9,490	$0	$556	$652
February	0	0	4,940	$0	$289	$348
March	0	0	4,730	$0	$277	$334
April	0	0	2,580	$0	$155	$194
May	0	0	1,330	$0	$80	$67
June	0	0	280	$0	$17	$37
July	0	0	90	$0	$5	$24
August	0	0	300	$0	$18	$39
TOTALS		**0**	**33,540**	**$0**	**$1,972**	**$2,421**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Birdtail Country Museum is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.8.3 - Lighting Analysis Summary for Birdtail Country Museum

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Fluorescents - Convert 4' T12s to 4' T8s (5x2)	10	255	$15	153	$9
Indoor Flood Lights - no upgrade recommended.	8	2,080	$125	2,080	$125
Indoor 60 W Incandescents- Replace with Compact Fluorescents	19	593	$36	128	$8
Indoor 100 W Incandescents - Replace with Compact Fluorescents	6	312	$19	81	$5
TOTALS		**3,240**	**$195**	**2,443**	**$147**

Annual Energy Savings (kWh)	**797**
Annual Cost Savings	**$48**
Percent Annual Energy Savings	**25%**

These calculations are assuming that the museum is occupied 10 hours per week (520 hours per year).

Table B.8.4 (a) Window and Door Replacement Calculations for Birdtail Country Museum

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace wood doors with insulated wood doors (3)	63	1.578	1,953	$117	6.67	462	$28	1,491	$90
Replace boarded windows with triple pane windows (2)	35	1.000	1,712	$103	6.25	274	$16	1,438	$86
TOTALS			**3,665**	**$220**		**736**	**$44**	**2,929**	**$176**

Table B.8.4 (b) Window and Door Infiltration Calculations for Birdtail Country Museum

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Main Floor Front Window - 4.5'x9' (1)	6.75	0.025	50	9	1,662,108	487	$29
Second Floor Windows - 2.9'x4.3' (6)	21.6	0.025	50	30	5,318,746	1,559	$94
Second Floor Windows - 3'x3' (3)	9	0.025	50	12	2,216,144	649	$39
Main Floor Boarded Windows 3.5'x5' (2)	8.50	0.025	50	12	2,093,025	613	$37
Wood Doors (3)	15.00	0.05	125	51	9,233,935	2,706	$162
TOTALS						**6,015**	**$361**

Table B.8.4 (c) Upgrade Wall/Roof Insulation for Birdtail Country Museum

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade wall insulation between rink and reception	2628	10.000	12,853	$772	20	6,427	$386	6,427	$386
TOTALS			**12,853**	**$772**		**6,427**	**$386**	**6,427**	**$386**

The temperature of the museum is assumed to be kept at 50 F.
The crack lengths are assumed to be a quarter of the perimeter of the windows and doors
The thermal conductivity of the wood doors are taken as 0.16 W/mK
The R value for the broken, boarded up windows is 1, The R value for the walls is 10

Table B.8.5 - Water Usage for Birdtail Country Museum

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	1	2	1,820	1.60	2,912	0.32	582	2,330	87	$5
Toilets	1	2	1,820	13.25	24,115	6.00	10,920	13,195		
Total					**27,027**		**11,502**	**15,525**	**87**	**$5**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	2	2	
Number of Uses/day	3	4	
Number of Toilets	1	1	
Toilet Uses/hr/fixture	0.75	1	1.75
Number of Sinks	1	1	
Sink Uses/hr/fixture	0.75	1	1.75

Current Hot Water Usage		
	L/Yr	**kWh**
Sinks	2,912	109
Totals	**2,912**	**109**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.9.1 Annual Energy Consumption for Recycling Depot

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	1,915	23%
HVAC	5,361	65%
Lighting	924	11%
Total	**8,200**	

Table B.9.2 - Electricity Usage for Recycling Depot

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	220	$0	$13	$51
October	0	0	0	$0	$0	$0
November	0	0	890	$0	$52	$95
December	0	0	0	$0	$0	$0
January-05	0	0	2,110	$0	$124	$177
February	0	0	0	$0	$0	$0
March	0	0	1,850	$0	$108	$159
April	0	0	0	$0	$0	$0
May	0	0	1,850	$0	$111	$159
June	0	0	900	$0	$54	$98
July	0	0	380	$0	$23	$62
August	0	0	0	$0	$0	$0
TOTALS		**0**	**8,200**	**$0**	**$485**	**$801**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

The electricity consumption for the Recycling Depot is charged based on the General Service Small, Single Phase Manitoba Hydro rates.

Table B.9.3 - Lighting Analysis Summary for Recycling Depot

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor 100W Incandescent - Convert to Compact Fluorescent	1	88	$5	23	$1
Indoor 150W Incandescent - Convert to Compact Fluorescent	3	398	$24	106	$6
Outdoor 100W Incandescent - Convert to High Pressure Sodium Lights	1	438	$26	219	$13
TOTALS		**924**	**$55**	**348**	**$21**

Annual Energy Savings (kWh)	**576**
Annual Cost Savings	**$35**
Percent Annual Energy Savings	**62%**

These calculations are assuming that the recycling depot is occupied 17 hours per week (884 hrs/yr)

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.9.4 (a) Window and Door Replacement Calculations for Recycling Depot

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (°F ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (°F ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace 3'x7' wood door with insulated door (1)	21	1.578	626	$38	6.67	146	$9	480	$29
Replace 2'x2' windows with triple pane windows (2)	8	2.000	188	$11	6.25	60	$4	129	$8
TOTALS			**814**	**$49**		**206**	**$12**	**608**	**$37**

Table B.9.4 (b) Window and Door Infiltration Calculations for Recycling Depot

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Wood Door (1)	10	0.05	125	34	5,856,684	1,716	$103
Leaky Windows - 2'x2' (2)	8	0.025	50	11	1,874,139	549	$33
TOTALS						**2,266**	**$136**

Table B.9.4 (c) Upgrade Walls and Roof Insulation for Recycling Depot

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (°F ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (°F ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade wall insulation	448	12.000	1,756	$105	20	1,042	$63	714	$43
Upgrade roof insulation	192	20.000	452	$27	40	223	$13	228	$14
TOTALS			**2,208**	**$133**		**1,266**	**$76**	**942**	**$57**

The temperature of the recycling depot is assumed to be maintained at 50 F.
The door is assumed to be 3'x7' and the windows are 2'x2'
The thermal conductivity of the wood door is taken as 0.16 W/mK and the R value of the windows is 2.0
The R value of the walls and the roof are taken as 20 and 12, resperctively

Table B.9.5 Energy Consumption and Savings Calculations for Motors in Recycling Depot

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Can Crusher	5	4.0	468	4.70	3.51	1,642	0.12	0.09	42
Glass Crusher	0.5	0.4	780	0.47	0.35	274	NA	NA	NA
TOTALS						**1,915**			**42**

Table B.10.1 Annual Energy Consumption for Tourist Information Building

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	130	3%
Hot Water	142	3%
Lighting	4,418	94%
Total	**4,690**	

Table B.10.2 - Electricity Usage for Tourist Information Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
September-04	0	0	0	$0	$0	$0
October	0	0	4,690	$0	$275	$320
November	0	0	0	$0	$0	$0
December	0	0	0	$0	$0	$0
January-05	0	0	0	$0	$0	$0
February	0	0	0	$0	$0	$0
March	0	0	0	$0	$0	$0
April	0	0	0	$0	$0	$217
May	0	0	0	$0	$0	$0
June	0	0	0	$0	$0	$0
July	0	0	0	$0	$0	$0
August	0	0	0	$0	$0	$0
TOTAL		**0**	**4,690**	**$0**	**$275**	**$537**

Notes

The Total Charge for the month of April is the Annual Basic Charge of 190.32 plus taxes.

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.10.3 - Lighting Analysis Summary for Tourist Information Building

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Washroom Incandescents - Convert to Compact Fluorescents	6	518	$31	130	$8
Entrance Area Incandescents - Convert to Compact Fluorescents	4	864	$52	230	$14
Main Hall Incandescents-Convert to Compact Fluorescents	6	1,296	$78	346	$21
Storage Area Incandescents - Convert to Compact Fluorescents	2	864	$52	225	$13
Outdoor Incandescents - Convert to High Pressure Sodium Lights	2	876	$53	245	$15
TOTALS		**4,418**	**$265**	**1,176**	**$71**

Annual Energy Savings (kWh)	**3,243**
Annual Cost Savings	**$195**
Percent Annual Energy Savings	**73%**

These calculations are assuming that the tourist information building is occupied 4 months of the year,12 hours per day (1440 hours per year)

The Exit signs are assumed to be on 24 hours a day, 365 days per year

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.10.4 (a) Window and Door Replacement Calculations for Tourist Information Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace 30"x90" single pane windows with triple pane windows (6).	112.5	2.000	288	$17	6.25	92	$6	196	$12
TOTALS			**288**	**$17**		**92**	**$6**	**196**	**$12**

Table B.10.4 (b) Window and Door Infiltration Calculations for Tourist Information Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Windows (6)	60	0.025	50	82	1,546,654	453	$27
TOTALS						**453**	**$27**

The heating degree days were added up over the summer months only, the heat is shut off in the winter

The temperature of the Tourist Information Centre is 70 F throughout the summer

The current R-value of the single pane window is taken as 2.0

The crack length around the windows is taken as half the perimeter

Table B.10.5 - Water Usage for Tourist Information Building

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Main Floor Washroom										
Sinks	1	1	765	1.60	1,224	0.32	245	979	37	$2
Toilets	1	1	765	13.25	10,136	6.00	4,590	5,546	NA	NA
Total					**11,360**		**4,835**	**6,525**	**37**	**$2**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	3	2	
Number of Toilet Uses/day	3	4	
Number of Toilets	4	4	
Toilet Uses/hour/fixture	0.28	0.25	0.53
Number of Urinals	-	2	
Number of Urinal Uses/day	-	3	
Urinal Uses/hr/fixture	-	0.375	0.375
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.28	0.25	0.53

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	1,224	46
Total		**46**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the toilets use 1.5 gallons per flush

Table B.11.1 Annual Energy Consumption for Water Treatment Plant

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	78,622	62.0%
HVAC	43,543	34.4%
Lighting	3,411	2.7%
Hot Water	1,164	0.9%
Total	**126,740**	

Table B.11.2 - Electricity Usage for Water Treatment Plant

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	7,680	$0	$450	$538
October	0	0	9,500	$0	$557	$660
November	0	0	11,000	$0	$645	$760
December	0	0	14,700	$0	$789	$924
January-05	0	0	15,180	$0	$807	$945
February	0	0	10,330	$0	$605	$715
March	0	0	13,490	$0	$742	$871
April	0	0	11,560	$0	$684	$801
May	0	0	8,560	$0	$514	$611
June	0	0	11,110	$0	$667	$785
July	0	0	5,850	$0	$351	$425
August	0	0	7,780	$0	$467	$558
TOTALS		**0**	**126,740**	**$0**	**$8,594**	**$8,594**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.11.3 - Lighting Analysis Summary for Water Treatment Plant

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Fluorescents - Convert 8' T12s to 8' T8s (6x2)	12	2,973	$179	1,384	$83
Outdoor Incandescent - Convert to Compact High Pressure Sodium Lights	1	438	$26	114	$7
TOTALS		**3,411**	**$205**	**1,498**	**$90**

Annual Energy Savings (KWH) **1,913**
Annual Cost Savings **$115**
Percent Annual Energy Savings **56%**

These calculations are assuming that the water treatment plant is occupied 6 hours per day (2136 hours per year)

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.11.4 (a) Window and Door Infiltration Calculations for Water Treatment Plant

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Metal Exterior Door (1)	9.67	0.05	125	33	7,930,852	2,324	$140
26"x42" Double Pane Window (1)	2.83	0.025	50	4	929,824	273	$16
55"x29" Double Pane Window (1)	3.50	0.025	50	5	1,148,606	337	$20
TOTALS						**2,933**	**$176**

Table B.11.4 (b) Upgrade Wall/Roof Insulation for Water Treatment Plant

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2 hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2 hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade Wall Insulation	1485	12.000	15,567	$935	20	9,340	$561	6,227	$374
TOTALS			**15,567**	**$935**		**9,340**	**$561**	**6,227**	**$374**

The temperature of the water treatment plant is assumed to be kept at 59 F.

The current wall insulation is assumed to have an R-value of 12.

The crack lengths around the windows are taken as a quarter of the perimeter and around the doors they are taken as half the perimeter.

Table B.11.5 Energy Savings with Heating, Ventilating, and Air Conditioning for the Water Treatment Plant

Description	Quantity	Flow Rate (cfm)	Heating Degree Days below 59 F	Heating Efficiency	Energy Savings (kWh)
Install motorized damper on greasehood make up air duct	1	20	9267	100%	1,408

Description	% of Time Unoccupied	Heating Degree Days below 59 F	Heating Degree Days below 50 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback Thermostats to 50 F	100.00%	9267	6615.36	43,543	12,459

Table B.11.6 Energy Consumption and Savings Calculations for Motors in Water Treatment Plant

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Raw Water Pump	10	8	3,845	9.41	7.02	26,973	0.20	0.15	573
Filter Transfer Pump 1	15	12	2,136	14.11	10.52	22,478	0.30	0.22	478
Filter Transfer Pump 1	15	12	2,136	14.11	10.52	22,478	0.30	0.22	478
Chemical Feed Pumps	0.23	0	3,845	0.22	0.16	624	NA	NA	NA
Polymer Mixer	0.25	0	3,845	0.24	0.18	674	NA	NA	NA
Air Scour Blower	2	2	3,845	1.88	1.40	5,395	NA	NA	NA
TOTALS						**78,622**			**1,529**

Table B.12.1 Annual Energy Consumption for Reservoir Buildings

	Energy Consumption (KWH)	% of Total Energy Consumption
Motors	24,009	44.4%
HVAC	29,905	55.3%
Lighting	146	0.3%
Total	**54,060**	

Table B.12.2 - Electricity Usage for Reservoir Buildings

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September-04	0	0	4,020	$0	$236	$294
October	0	0	3,290	$0	$193	$245
November	0	0	5,710	$0	$335	$406
December	0	0	3,980	$0	$233	$291
January-05	0	0	7,920	$0	$464	$554
February	0	0	4,440	$0	$260	$322
March	0	0	7,200	$0	$422	$506
April	0	0	3,810	$0	$229	$284
May	0	0	5,270	$0	$316	$386
June	0	0	2,080	$0	$125	$167
July	0	0	4,020	$0	$241	$300
August	0	0	2,320	$0	$139	$184
TOTALS		**0**	**54,060**	**$0**	**$3,939**	**$3,939**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.12.3 - Lighting Analysis Summary for Reservoir Buildings

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Incandescents - Convert to Compact Fluorescents	4	146	$9	38	$2
TOTALS		**146**	**$9**	**38**	**$2**

Annual Energy Savings (KWH)	**108**
Annual Cost Savings	**$6**
Percent Annual Energy Savings	**74%**

These calculations are assuming that the Reservoir is occupied 5 hours per week for servicing

Table B.12.4 (a) - Window and Door Infiltration Calculations for Reservoir Buildings

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Reservoir building exterior door	5.16667	0.05	125	18	4,238,904	1,242	$75
Reservoir pumphouse exterior door	5	0.05	125	17	4,102,165	1,202	$72
TOTALS						**2,445**	**$147**

Table B.12.4 (b) Upgrade Wall/Roof Insulation for Reservoir Buildings

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade wall insulation on both buildings	1162.5	8.000	18,280	$1,098	20	7,312	$439	10,968	$659
TOTALS			**18,280**	**$1,098**		**7,312**	**$439**	**10,968**	**$659**

The Reservoir Building's are assumed to be kept at 59 F

The crack lengths are taken as a quarter of the perimeter of the door.

The current R-value of the walls is assumed to be 8.0.

Table B.12.5 Energy Consumption and Savings Calculations for Motors in Reservoir

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Priming Pump	0.33	0.3	1460	0.31	0.23	338	NA	NA	NA
Backup Pump	0.33	0.3	1460	0.31	0.23	338	NA	NA	NA
Distribution Pump 1	7.5	6.0	2190	7.06	5.26	11,523	0.18	0.13	294
Distribution Pump 2	7.5	6.0	2190	7.06	5.26	11,523	0.18	0.13	294
Chemical Feed Pump	0.56	0.4	730	0.53	0.39	287	NA	NA	NA
TOTALS						**24,009**			**588**

Table B.13.1 Annual Energy Consumption for North Hill Booster Station

	Energy Consumption (kWh)	% of Total Energy Consumption
Motors	20,165	85%
HVAC	3,549	15%
Lighting	146	1%
Total	**23,860**	

Table B.13.2 - Electricity Usage for North Hill Booster Station

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	2,140	$0	$125	$168
October	0	0	1,620	$0	$95	$133
November	0	0	1,780	$0	$104	$144
December	0	0	2,220	$0	$130	$173
January	0	0	3,010	$0	$176	$226
February	0	0	2,350	$0	$138	$182
March	0	0	2,200	$0	$129	$172
April	0	0	1,750	$0	$103	$144
May	0	0	2,330	$0	$140	$185
June	0	0	930	$0	$56	$89
July	0	0	2,500	$0	$150	$196
August	0	0	1,030	$0	$62	$96
TOTAL		**0**	**23,860**	**$0**	**$1,408**	**$1,908**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.13.3 - Lighting Analysis Summary for North Hill Booster Station

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Incandescents - Convert to Compact Fluorescents	2	146	$9	44	$3
TOTALS		**146**	**$9**	**44**	**$3**

Annual Energy Savings (kWh)	**102**
Annual Cost Savings	**$6**
Percent Annual Energy Savings	**70%**

These calculations are assuming that the North Hill Booster Station is occupied 1 hour per day

Table B.13.4 (a) Window and Door Infiltration Calculations for North Hill Booster Station

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Metal Exterior Door (1)	4.83	0.05	125	17	2,830,731	830	$50
TOTALS						**830**	**$50**

Table B.13.4 (b) Upgrade Wall/Roof Insulation for North Hill Booster Station

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Insulate Walls	581	12.000	2,253	$135	20	1,352	$81	901	$54
TOTALS			**2,253**	**$135**		**1,352**	**$81**	**901**	**$54**

The temperature of this station is assumed to be maintained at 50 F

The current wall insulation is assumed to be R-12

The crack length around the door is taken as a quarter of the perimeter of the door

Table B.13.5 Energy Consumption and Savings Calculations for Motors in North Hill Booster Station

Description	Rated HP	Required HP	# of hours	Current, 85 % Efficient Motor			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	kW	kWh	Actual HP	kW	kWh
Booster Pump	8	3	8,760	3.09	2.30	20,165	0.08	0.06	514
TOTALS						**20,165**			**514**

Table B.14.1 Annual Energy Consumption for South Hill Booster Station

	Energy Consumption (KWH)	% of Total Energy Consumption
HVAC	4,254	96.7%
Lighting	146	3.3%
Total	**4,400**	

Table B.14.2 - Electricity Usage for South Hill Booster Station

	Consumption Data			Calculated Costs		
Month (2004-2005)	**Maximum KVA**	**Billed KVA**	**Energy (kWh)**	**Demand Charge**	**Energy Charge**	**Total Charge**
September	0	0	120	$0	$7	$33
October	0	0	260	$0	$15	$42
November	0	0	450	$0	$26	$55
December	0	0	600	$0	$35	$65
January	0	0	1,010	$0	$59	$92
February	0	0	840	$0	$49	$81
March	0	0	790	$0	$46	$78
April	0	0	330	$0	$19	$48
May	0	0	0	$0	$0	$0
June	0	0	0	$0	$0	$0
July	0	0	0	$0	$0	$0
August	0	0	0	$0	$0	$0
TOTAL		**0**	**4,400**	**$0**	**$258**	**$494**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.14.3 - Lighting Analysis Summary for South Hill Booster Station

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Incandescents - Convert to Compact Fluorescents	2	146	$9	44	$3
TOTALS		**146**	**$9**	**44**	**$3**

Annual Energy Savings (kWh)	**102**
Annual Cost Savings	**$6**
Percent Annual Energy Savings	**70%**

These calculations are assuming that the South Hill Booster Station is occupied for 1 hour a day

Table B.14.4 (a) Window and Door Infiltration Calculations for South Hill Booster Station

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Metal Insulated Door (1)	4.83	0.05	125	17	2,830,731	830	$50
TOTALS						**830**	**$50**

Table B.14.4 (b) Upgrade Wall/Roof Insulation for South Hill Booster Station

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade wall insulation	581	12.000	2,253	$135	20	1,352	$81	901	$54
TOTALS			**2,253**	**$135**		**1,352**	**$81**	**901**	**$54**

The temperature is assumed to be maintained at 50 F

The crack length is taken as a quarter of the perimeter of the door.

The current insulation is assumed to have an R value of 12

APPENDIX C

WATER EFFICIENCY

TABLE OF CONTENTS – APPENDIX C

Leaks

- A leak of one drop per second wastes 10,000 litres of water per year. A toilet that runs after a flush can waste 200,000 litres of water per year. Fixing a hot water leak will save energy as well as water.

- Check for differing water meter readings at bedtime and in the morning. If no water has been intentionally used, a difference in meter readings indicates a leak.
- If a few drops of food colouring put in your toilet tank seep into the toilet bowl (without flushing), check the flapper valve, valve seat and flapper lift chain for the source of the leak.
- Conduct a periodic "leak check" a minimum of twice a year on water using fixtures and appliances, including outside hose connections. Replace worn washers, O-rings and faulty fixtures.

On-Site Wastewater Systems

- Wise water management is necessary. All septic systems have limitations and water conservation should be practiced.
- Do not use substitutes for toilet paper. These products may not decompose in the tank and could clog the system.
- Perform regular maintenance checks on your entire system, including regular pump outs of the septic tank and inspection of the disposal field for signs of saturation or leakage.

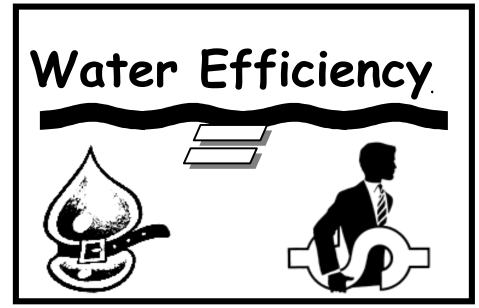
For More Information, Please Contact:

Water Efficiency Coordinator
Pollution Prevention
Manitoba Conservation
123 Main Street, Suite 160
Winnipeg MB R3C 1A5

Phone: (204) 945-8980 or
1-800-282-8069 ext. 8980
Fax: (204) 945-1211
E-mail: lliebgott@gov.mb.ca

Publication Number: 98-06E

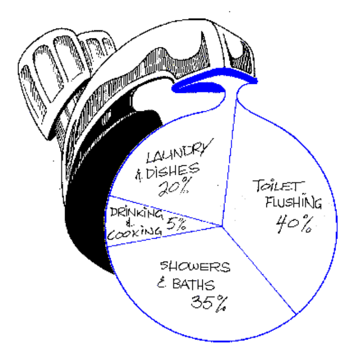
Pollution Prevention
Manitoba Conservation



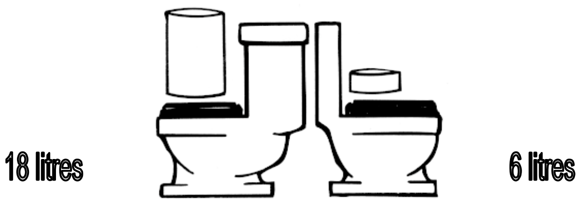
Water Use

How you can reduce yours!

- Save money.
- Delay the need to expand our water and wastewater treatment plants.
- Prolong the life of in-ground sewage disposal systems, i.e., septic fields.
- Protect our water sources.



Bathroom



- Replace toilets that flush 13 to 26 litres of water with 6 litre or dual flush toilets, cutting water used by toilets by half or more. See www.cwwa.ca for toilet performance ratings. In the mean time, reduce water per flush in toilets by up to 35% by installing early closure devices (don't use bricks – as they break down, pieces interfere with the flapper seal).
- Refrain from using the toilet to dispose of trash.
- A partially filled tub uses less water than a long shower; a short shower uses less than a full tub.
- Replace your 20 litre per minute showerhead with a low-flow 9.5 litre per minute showerhead. You'll use less than half the water.
- Make it a habit to be finished your shower in less than 5 minutes.
- Install a water conserving 3.5 litre per minute aerator on your bathroom tap.
- When shaving, rinse the razor in a cup or a partially filled sink instead of letting the tap run.
- Brush teeth using a glass of water to rinse.

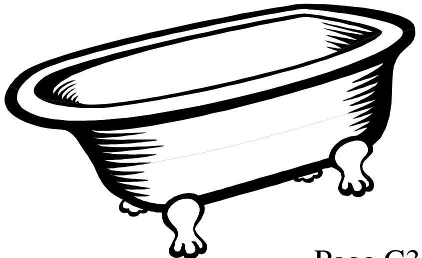
Kitchen & Laundry

- Install a water saving 9 litre per minute aerator on the kitchen tap.
- Rinse dishes in a stoppered sink or basin, not with running water.
- Wash vegetables in a basin or stoppered sink, then quickly rinse using running water.
- Keep drinking water in the fridge. Wash the container and change the water every few days.
- Thaw food in the fridge rather than under a running tap. This conserves both energy and water.

- Compost organic wastes instead of using a sink garbage disposal.
- Buy a low water use dishwasher to save on energy, water and detergent costs.
- Wash only full loads of laundry and dishes.
- Front loading washing machines use less water than top-loading washers do. If unavailable, choose a clothes washer with a suds saver, and water saving cycle.

General Water Use

- Only use water treatment or softening systems, if required. If possible, only use softened water for bathing and cleaning – use unsoftened water for cooking, drinking and watering plants.
- Ensure a water softener regenerates only when the resin is exhausted.
- Turn the system off if you will be away for more than a few days.
- Insulate hot water tank and pipes to reduce the need to run water until it is hot. Install a heat trap on the pipe above your water heater to save energy and water.
- Know location of sink, toilet and main shut off valves in case a pipe or water heater blows, or so you can turn off your water when you are away.
- If your water pipes tend to freeze, do not let the tap run continuously. This wastes water, and overloads sewer systems. Instead, install heat tape or connect a pump-back reservoir system (discuss options with your plumber, electrician or call Manitoba Conservation).



APPENDIX D

INCENTIVE PROGRAMS

TABLE OF CONTENTS – APPENDIX D

Table D.1 Manitoba Hydro Power Smart Incentives

Item	Incentives	Contacts
Compact Fluorescents	$5 - Non-reflectorized screw in lamp, $10 - Reflectorized screw-in lamp, $45 - New hard wired fixture	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
T8 Electronic Fluorescents	T8 Premium Ballast - $20, T8 Standard Ballast - $15, T8 Dimmable Ballast - $60, 8 Foot T8 Ballast - $35	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
LED Exit Signs	$45 per new sign	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
High Pressure Sodium Lighting	The lesser of $500 per kilowatt saved or $100 of lighting fixture cost	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
Parking Lot Controllers	$25 for each controlled circuit	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Air Barrier System	$0.46 per square foot or $5 per square meter of net wall area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Windows	Depends on replacement window's U-Value and net window area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Geothermal Heat Pump	Manitoba Hydro will pay up to half the cost of a feasabillity study to help decide whether a geothermal heat pump is the right choice for you building. Manitoba Hydro also offers a custom incentive towards the capital cost of your heat pump system, based on the energy savings calculated in the feasability study.	Domenic Marinelli at dmarinelli@hydro.mb.ca or 204-474-4273

Notes

For general information and information kits contact:
Power Smart for Business
Phone: 474-3676
Email Address: powersmartforbusiness@hydro.mb.ca

Table D.2. Other Incentive Programs

Program Name	Eligibility	What Type of Projects are Available	Ref. Page	Available Funding	Funding Maximums	Deadline For Applications	Prospect of Funding	Project Sponsor	Contact	Email	Website
Energy Innovators Initiative: Energy Retrofit Assistance (ERA)	Comm. & Institutional Bldgs. Aboriginal, northern, rural or remote communities may receive special consideration.	Projects that reduce energy consumption. Includes costs for project planning and development, materials and labour, monitoring and tracking and staffing training and awareness.	13	$7.50/GJ (277.8 kW H)	up to 25% of costs based on energy savings ($250,000 max)	On-going	Good	NRCan	MarieLynn Tremblay	Marie_Lyne.Tremblay@nrcan-rncan.gc.ca	http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/implementation.cfm?attr=0
Municipal Rural Infrastructure Fund (MRIF)	All MB local governments	Projects that construct, restore or improve infrastructure that ensures sustainable use and management of water and wastewater resources. Projects that construct, restore or improve public arts and heritage infrastructure, such as museums, heritage sites, sites for performings arts, and cultural or community centres. - See detailed program info for more info. Program has many requirements and caveats.	23, 46, 54		2/3 of the approved costs	On-going	Good	Canada-Manitoba Infrastructure Programs		infra@gov.mb.ca	http://www.infrastructure.mb.ca/e/index.html
Renewable Energy Development Initiative (REDI)	…Municipalities…, solar air/water heating, biomass	Projects involving solar air or water heating and clean burning biomass combustion projects.	25	25% of purchase and install of qualifying system	$80,000	31-Mar-07		NRCan		redi.penser@nrcan.gc.ca	http://www2.nrcan.gc.ca/es/erb/erb/english/View.asp?x=455
Community Places Program	Non-profit community organizations in MB, except public schools, universities, hospitals, nursing homes, monnercial coops, federal, provincial and city of Winnipeg departments.	Projects involving the upgrading, construction or acquisition of community facilities available to the general community. Priority given to proposals for critical repairs to extend the life of existing well-used facilities. Projects must provide lasting, long-term benefits to the community.		Up to 50% of first $15,000 and 1/3 of the rest of project	$50,000			Manitoba Culture, Heritage and Tourism	Varies by region	www.gov.mb.ca/chc/grants	http://www.gov.mb.ca/chc/grants
Sustainable Development Innovations Fund (SDIF)	Municipal corporations, local governments, private and non-profit organizations and businesses	Sustainable community development, Eco-efficiency initiatives, environmental stewardship. Emphasis on youth involvement, first nations and northern communities.	55		$50,000 (usually $25,000 or less)		fair	Manitoba Conservation		sdif@gov.mb.ca	http://www.gov.mb.ca/conservation/pollutionprevention/sdif/index.html

APPENDIX E

TRANSPORTATION AND EQUIPMENT EFFICIENCY

TABLE OF CONTENTS – APPENDIX E

Transportation and Equipment Efficiency for Small Municipalities (< 10,000 population).

Municipal governments may wish to:

- Assess Regulatory, Standards & Industry “Best Practices” to ensure compliance and demonstrated “Due Diligence”. Includes Provincial, Federal, Society of Automotive Engineers (SAE), Canadian Standards Association (CSA), American National Standards Institute (ANSI), Workplace Safety & Health audits, Safety inspections, Workplace Hazardous Materials Information System (WHMIS), Transportation of Dangerous Goods regulation (TDG), etc.

- Review current fuelling habits & education on “economical operation” (Driver training, minimal idling, proper lubricants for seasonal operation etc.)

- Review “Alternative Fuel” options, e.g., Diesel and Biodiesel, Propane, Compressed Natural Gas (CNG). Note: Electric Vehicles are not an option yet due to initial cost and the prevailing ambient temperatures experienced in Manitoba

- Consider recycling initiatives for disposal of Fleet Waste Stream products, eg. tires, lubricating oil, anti-freeze, aerosol cans, paints, controlled products, ferrous & non-ferrous scrap metal, plastics etc.

Other Opportunities:

Transportation Demand Management

- Education & awareness programs on ride-sharing, telecommuting & teleconferencing

Encouragement of Alternative Modes of Transportation

- Possibility of van based transit or “pool” operations for commuting within towns & outlying areas. May be viable for transporting groups of employees to & from work locations

- Provision of bike racks, lockable bike containers or small fenced compounds at key locations

- Education & awareness programs on vehicle emissions, “fuel saving” driving habits etc.

Traffic & Parking Management

- Possibility of synchronizing traffic lights (if installed) and implementing parking fees etc. to manage parking

CHOOSING A VEHICLE

Vehicle Construction

The following points are important when considering fuel efficiency.

- A five speed manual transmission is about 5% more efficient than an automatic.
- Smaller engines use less fuel.
- Front wheel drive vehicles are lighter and therefore more fuel efficient than rear wheel drive vehicles
- SUV's tend to have low fuel efficiency
- Front wheel drive vehicles provide better traction than rear wheel drive in most cases.
- Small engines with a turbocharger can help make up the power difference between large and small engines by using energy from hot exhaust.

Vehicle Ratings

The Office of Energy Efficiency of Natural Resources Canada, issues a list of the most fuel efficient vehicles in each of a number of categories. See their website for the latest list.

Extra Features

Air conditioning, power steering, and roof racks are some of the big energy using extras. Air conditioning can increase your fuel consumption by 10 to 20 percent in city driving. A fully loaded roof rack can add 25% to your fuel costs. Even empty, it will add about 1% due to wind resistance

DRIVING ECONOMICALLY

Driving technique is critical to fuel economy.

- Maintain recommended tire pressure to maximize fuel efficiency and tire life.
- Keep your engine well tuned and maintained.
- One minute of idling uses more fuel than restarting the engine.
- Avoid jack-rabbit starts.
- An open sun roof and open windows increase air resistance, especially on the highway. Use the car's ventilation system instead.
- Most cars use 10% less fuel when driven at 55 miles per hour as opposed to 62, or 90 kilometers as opposed to 100.
- Adjust your speed in advance of changes in traffic flow. Take your foot off the accelerator and progressively gear down rather than accelerating up to a stop sign and breaking hard.

ENGINE BLOCK HEATERS - IS THERE A SAVINGS?

- In sub-freezing temperatures, the first 15 to 20 minutes of driving, after a cold start cause the engine to use about 30% more fuel than a warm engine.
- A timer can be installed for your vehicle's block heater to start warming the engine a couple hours before you head out.
-

- With the cost of electricity accounted for, you should still come out ahead, over the course of a winter.

FUEL OPTIONS

- Diesel engines are more fuel efficient than gasoline engines, as Diesel contains 10% more energy per unit volume than gasoline. Higher diesel engine costs are offset by increased fuel economy and engine life.
- Many fleet operators are converting their vehicles to biodiesel for cost advantages and a cleaner burn.
- There are many advantages to a dual-fuel system, which allows you to switch between gasoline and propane or natural gas with the flick of a switch.
- Hybrid vehicles…

From the Office of Energy Efficiency, Natural Resources Canada:

Buying a Fuel-Efficient Vehicle

- Fuel consumption can vary widely from one vehicle to the next. Whether you're buying new or used, the choices you make today will either save you money (through reduced fuel consumption) or cost you money for years to come.

- How big is big enough? It's always a good idea to avoid buying more vehicle than you need. Larger vehicles tend to be heavier and have bigger and more powerful engines, so consider buying the most fuel-efficient vehicle that meets your everyday needs.

- If you're buying a new vehicle, check the EnerGuide label for its fuel consumption rating. EnerGuide labels are now affixed to all new light-duty vehicles sold in Canada.

- Fuel consumption ratings for all new cars, light-duty trucks and vans sold in Canada are also available in the free Fuel Consumption Guide. You can download a PDF version of the Guide, or call 1 800 387-2000 to order your free copy. Past editions are available, so you can also check fuel consumption ratings for used vehicles.

- Have a look at the list of the most recent winners of the EnerGuide Awards, presented each model year to the manufacturers of the most fuel-efficient vehicles in different classes – two-seater, subcompact, compact, mid-sized and large cars, as well as station wagons, vans, pickup trucks and special purpose vehicles.

- Your choice of transmission will directly affect the cost of the vehicle and its fuel consumption. As a general rule, a manual transmission is more fuel efficient than an automatic, assuming you shift properly. If you buy an automatic, the more gears, the better.

- Four-wheel drive and all-wheel drive offer superior traction and braking under slippery conditions, but the weight and friction of additional drivetrain parts can increase fuel consumption by 5 to 10 percent compared with two-wheel drive vehicles. How often would you need to use this option, and is it worth the extra fuel cost for as long as you own the vehicle?

- Under normal driving conditions, smaller engines deliver better fuel economy than larger engines. Choose the smallest engine that meets your everyday needs.

- Are you willing to pay a fuel penalty for as long as you own your vehicle just to have the convenience of options such as power windows, seats and mirrors? Many options increase fuel consumption by adding weight, increasing aerodynamic drag, or drawing extra power from the engine.

- Do you really need an air conditioner? Operating an air conditioner in hot weather can increase fuel consumption by more than 20 percent in city driving. Consider using the car's ventilation system and options such as a sunroof and tinted glass.

- For most drivers, cruise control saves fuel on the highway by keeping your speed constant and avoiding inadvertent speeding.

- Explore your fuel options. Will a fuel-efficient diesel vehicle meet your needs? What about propane or natural gas, which produce fewer greenhouse gas emissions and are cheaper to use than gasoline or diesel fuel? Ethanol fuel blends are also widely used by Canadian motorists. And hybrid vehicles, which use a combination of high-power batteries and an internal combustion engine, are beginning to appear on the North American market.

Please note – this list of websites is not comprehensive. They have not been reviewed for accuracy, but may provide ideas and options appropriate for some municipalities.

Other vehicle and equipment information can be found on the Internet at:
http://oee.nrcan.gc.ca/publications/infosource/home/index.cfm?act=category&PrintView=N&Text=N

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://www.edmunds.com/advice/specialreports/articles/102946/article.html

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://snow.grounds-mag.com/ar/grounds_maintenance_september_2/

http://www.missoulian.com/articles/2003/11/15/news/local/news03.txt

http://rocktoroad.com/grader.html

http://news.thomasnet.com/fullstory/29180/3281

http://www.forester.net/gx_0501_graders.html

http://www.epa.gov/greenkit/quick_start.htm#greenfleet

Self Audit

Municipal Operations -Efficiency Survey

(Transportation, Road Repair, Snow Clearance, Waste Disposal, etc.)

Name of Organisation: ____________________________

Address: ____________________________

____

____

Contact Name: ____________________________

Phone No. ______________

Name of person completing form: ______________________________

Date: ______________________

Vehicles and Construction Equipment						
	Gasoline	**Diesel**	**CNG**	**Propane**	**Other**	**Total**
Total Fuel Usage L/Year						
Greenhouse Gas Emissions (tonnes)						

Fuel Use Minimization Considerations

☐ What type of vehicles/equipment, if any, are you planning to replace in the next few years?____________________________________

____

____

☐ Can you downsize these vehicles/equipment?

Comments:____

____

____

☐ Can you make process or other changes to minimize use of, or eliminate these vehicles/equipment? Comments:_________________

____

____

☐ Do you have a policy in place to make fuel efficiency one of the vehicle/equipment purchase requirements? Yes ___ No ___

☐ Have you made operational changes such as reducing idling time of vehicles and equipment, and using block heaters and timers to reduce warm up time? Yes ___ No ___

☐ Have you encouraged more energy efficient driving behaviour through training, policies, and ongoing reminders? Yes ___ No ___

☐ Do you have procedures in place to detect and rectify leakage of above-ground and under-ground fuel storage tanks? Yes __ No ___

☐ Do you use automatic shut-off fill nozzles at pumps? Yes ___ No ___

Comments

APPENDIX F

ENERGY CONSUMPTION MONITORING SPREADSHEETS AND GRAPHS

TABLE OF CONTENTS – APPENDIX F

Table F.1 - Energy Consumption Monitoring Data for the Community Centre

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	3,661	180.5	3,661			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	4,000	441.4	4,000			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	58,461	607.2	58,461			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	64,800	987.6	64,800			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	53,661	1165.4	53,661			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	57,261	903.9	57,261			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	54,861	828.5	54,861			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	56,861	368.8	56,861			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	14,400	278.3	14,400			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	9,200	96.2	9,200			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	9,600	49.9	9,600			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	4,400	94.9	4,400			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	391,166	6002.6	391,166	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.1 - Energy Consumption Monitoring Graph for Birtle's Community Centre

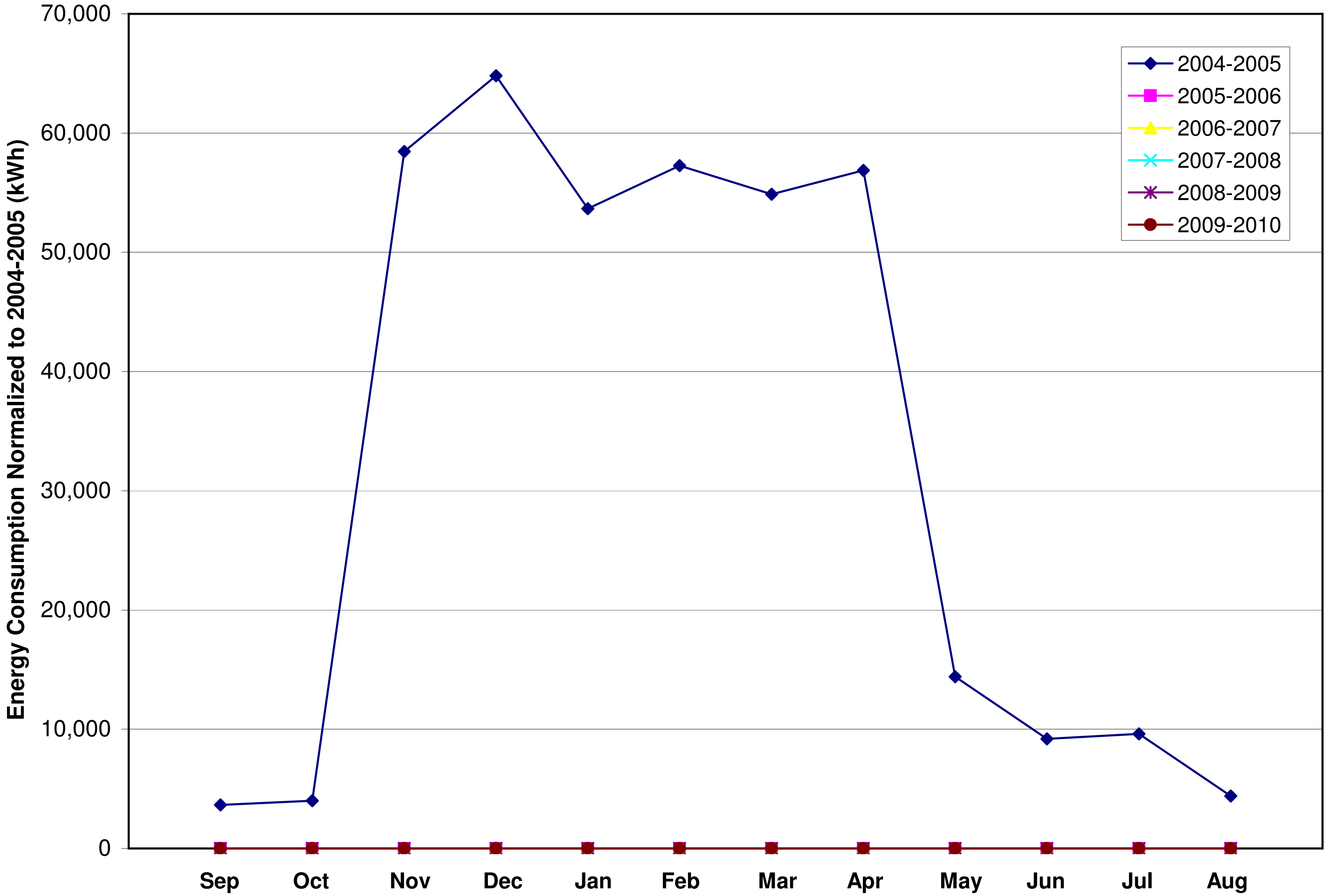


Table F.2 - Energy Consumption Monitoring Data for the Community Hall

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	2,000	180.5	2,000			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	4,480	441.4	4,480			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	6,960	607.2	6,960			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	9,520	987.6	9,520			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	16,800	1165.4	16,800			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	10,800	903.9	10,800			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	9,760	828.5	9,760			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	5,440	368.8	5,440			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	3,360	278.3	3,360			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	1,920	96.2	1,920			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	880	49.9	880			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	1,040	94.9	1,040			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	72,960	6002.6	72,960	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.2 - Energy Consumption Monitoring Graph for Birtle's Community Hall

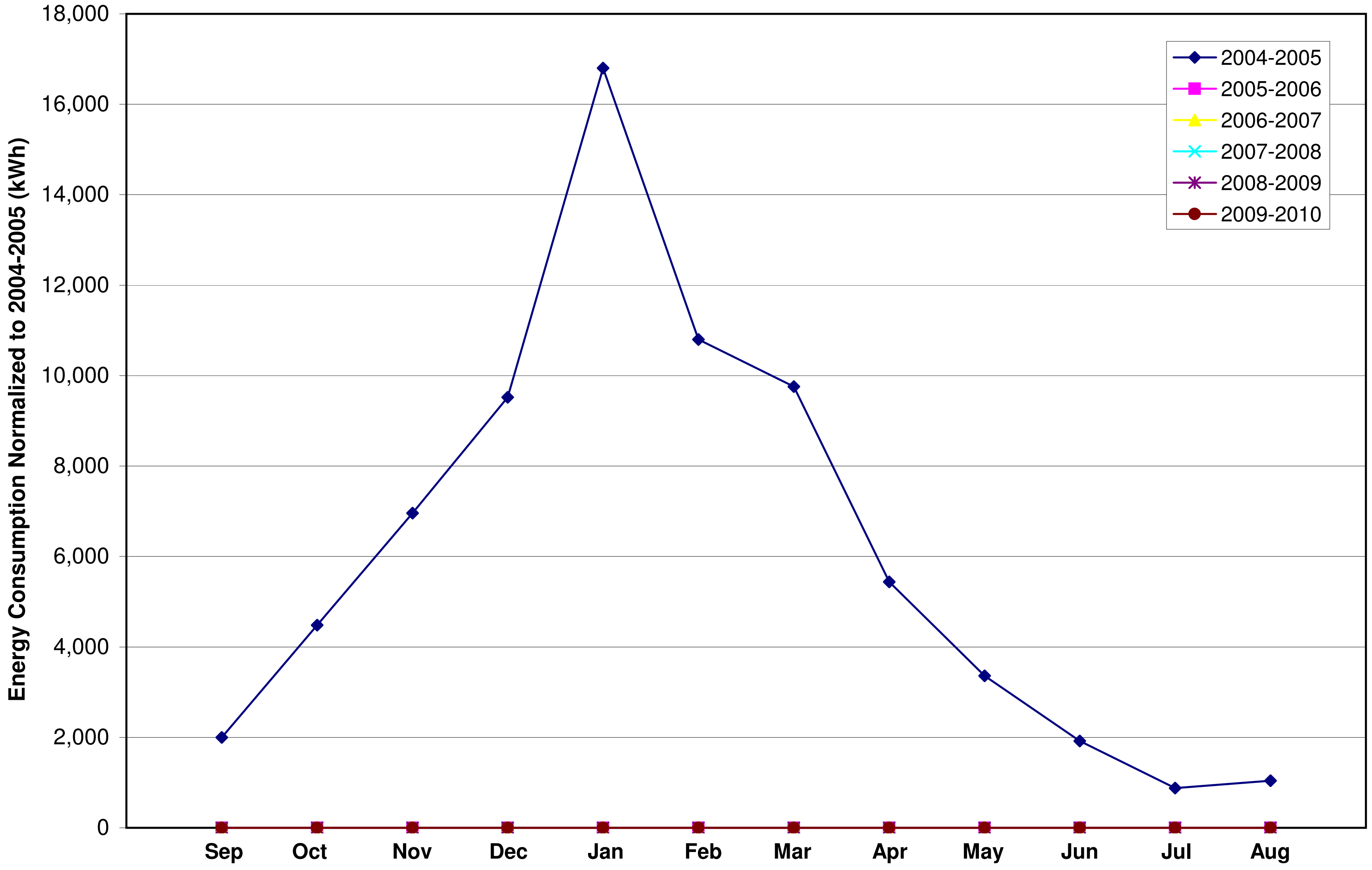


Table F.3 - Energy Consumption Monitoring Data for the Curling Club

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	402	180.5	402			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	6,162	441.4	6,162			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	17,322	607.2	17,322			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	16,002	987.6	16,002			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	20,922	1165.4	20,922			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	13,962	903.9	13,962			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	28,722	828.5	28,722			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	19,122	368.8	19,122			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	1,482	278.3	1,482			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	1,122	96.2	1,122			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	1,002	49.9	1,002			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	642	94.9	642			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	126,864	6002.6	126,864	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Da

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.3 - Energy Consumption Monitoring Graph for Birtle's Curling Club

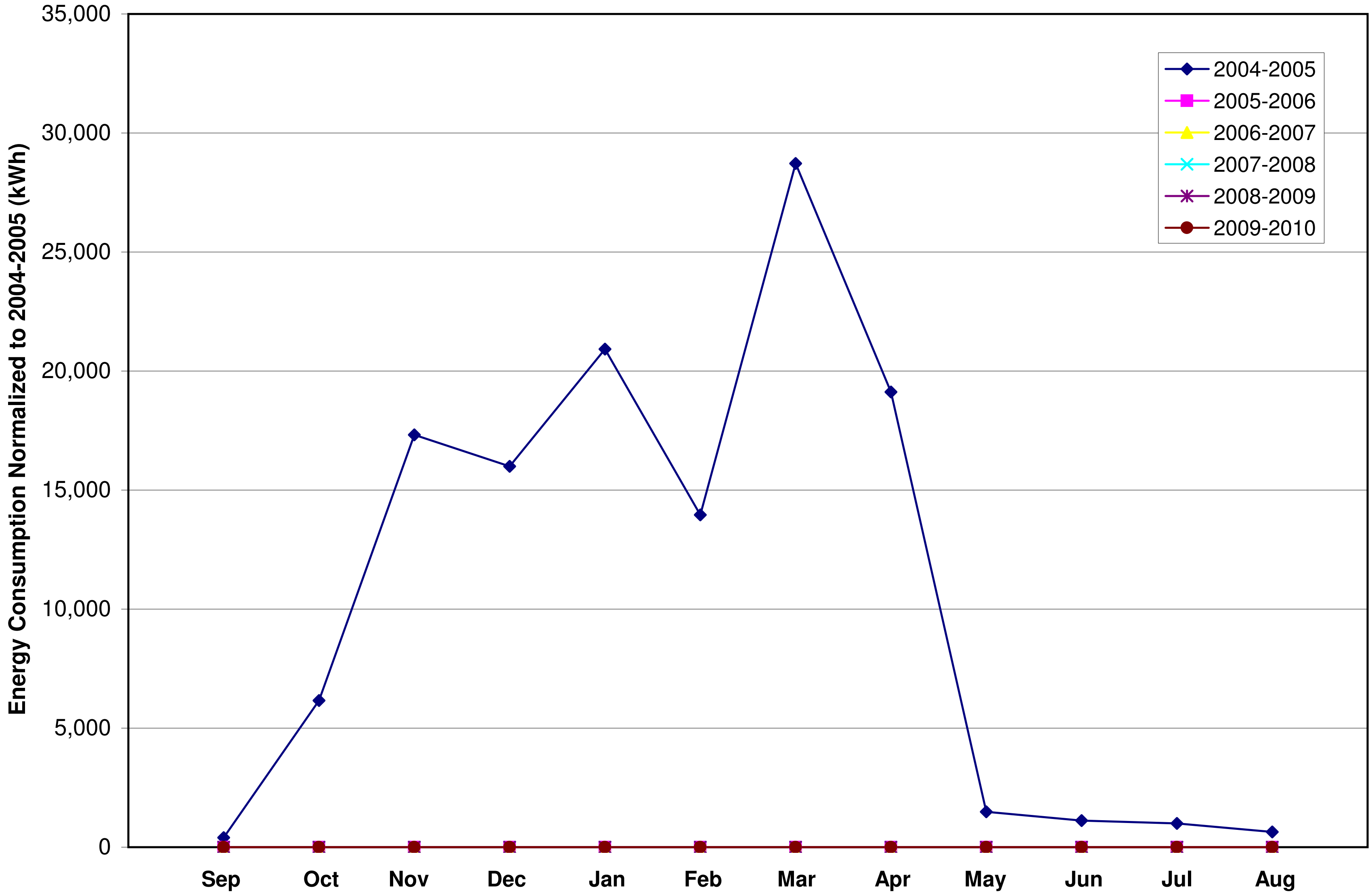


Table F.4 - Energy Consumption Monitoring Data for the Fire Hall

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	1,500	180.5	1,500			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	840	441.4	840			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	3,660	607.2	3,660			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	8,160	987.6	8,160			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	6,780	1165.4	6,780			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	7,320	903.9	7,320			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	5,400	828.5	5,400			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	4,080	368.8	4,080			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	2,460	278.3	2,460			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	1,500	96.2	1,500			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	780	49.9	780			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	540	94.9	540			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	43,020	6002.6	43,020	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.4 - Energy Consumption Monitoring Graph for Birtle's Fire Hall

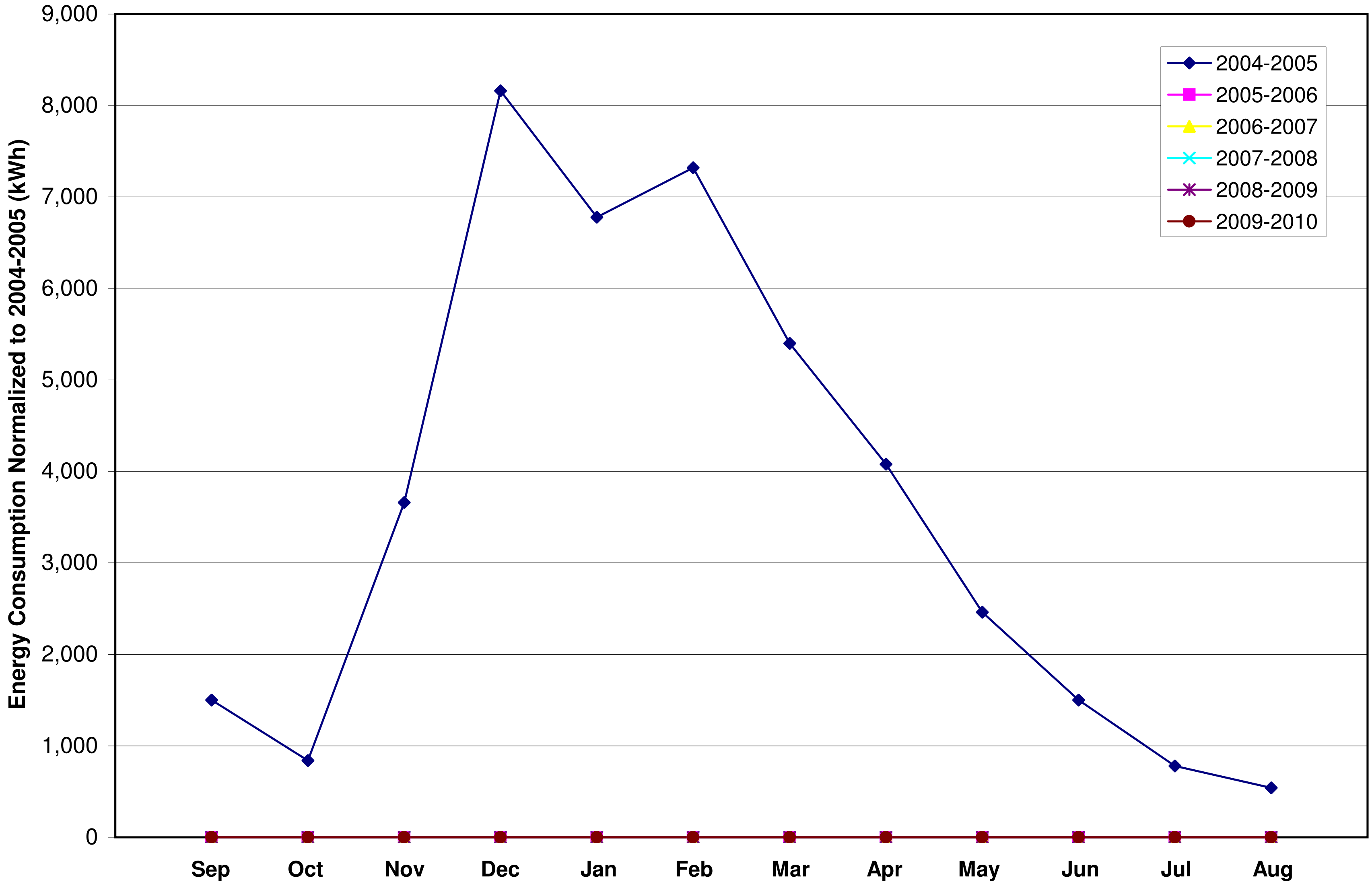


Table F.5 - Energy Consumption Monitoring Data for the Sewage Lift Station/Generator Building

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	2,220	180.5	2,220			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	2,700	441.4	2,700			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	3,840	607.2	3,840			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	5,160	987.6	5,160			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	7,320	1165.4	7,320			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	5,160	903.9	5,160			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	5,340	828.5	5,340			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	5,760	368.8	5,760			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	2,880	278.3	2,880			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	5,100	96.2	5,100			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	1,440	49.9	1,440			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	6,720	94.9	6,720			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	53,640	6002.6	53,640	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.5 - Energy Consumption Monitoring Graph for Birtle's Sewage Lift Station/Generator Building

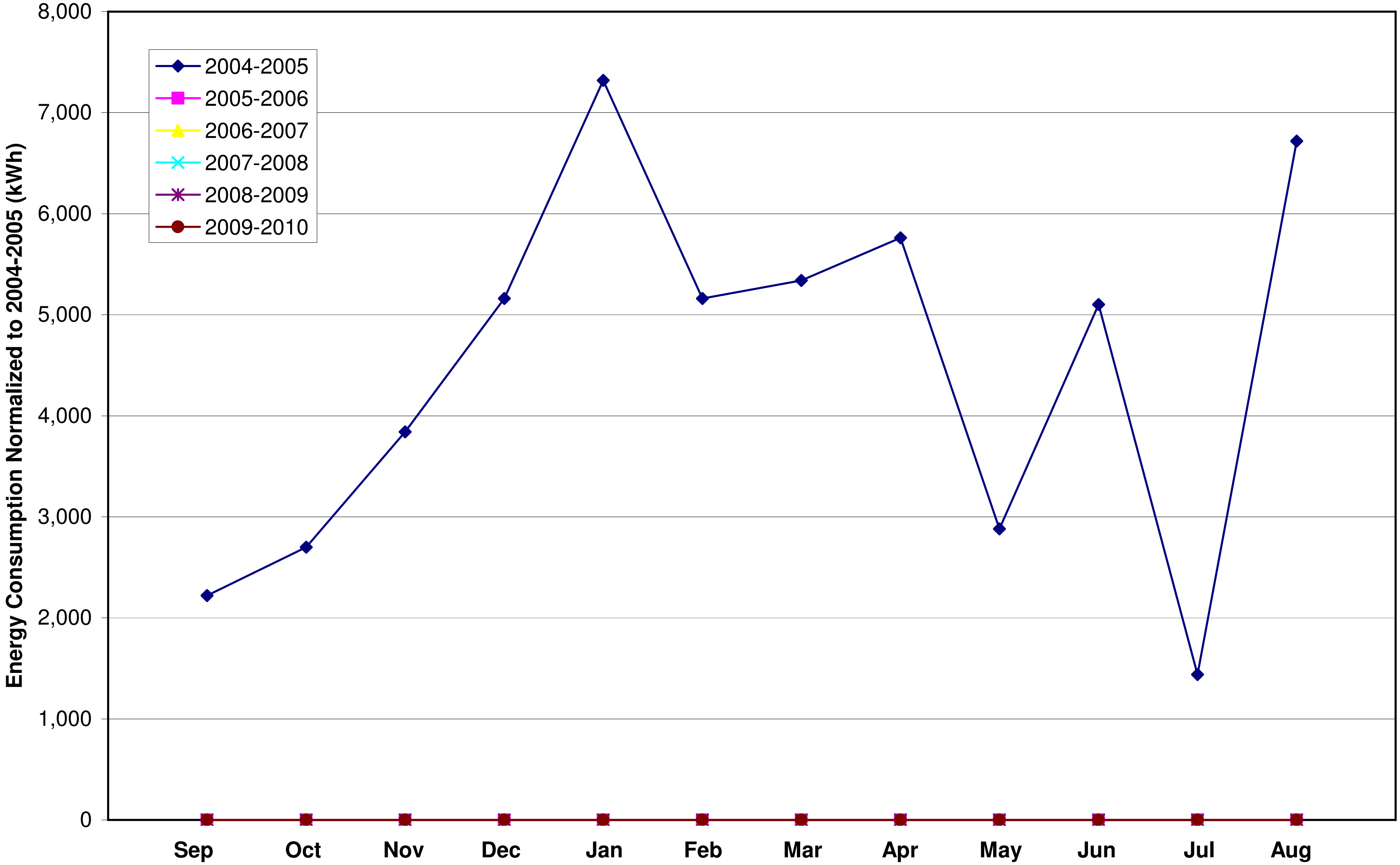


Table F.6 - Energy Consumption Monitoring Data for the Resource Centre CDC and Municipal Offices

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	4,240	180.5	4,240			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	4,160	441.4	4,160			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	6,080	607.2	6,080			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	6,720	987.6	6,720			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	11,280	1165.4	11,280			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	6,880	903.9	6,880			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	6,720	828.5	6,720			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	4,640	368.8	4,640			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	5,040	278.3	5,040			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	4,800	96.2	4,800			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	6,800	49.9	6,800			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	4,240	94.9	4,240			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	71,600	6002.6	71,600	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.6 - Energy Consumption Monitoring Graph for Birtle's Resource Centre CDC & Municipal Offices

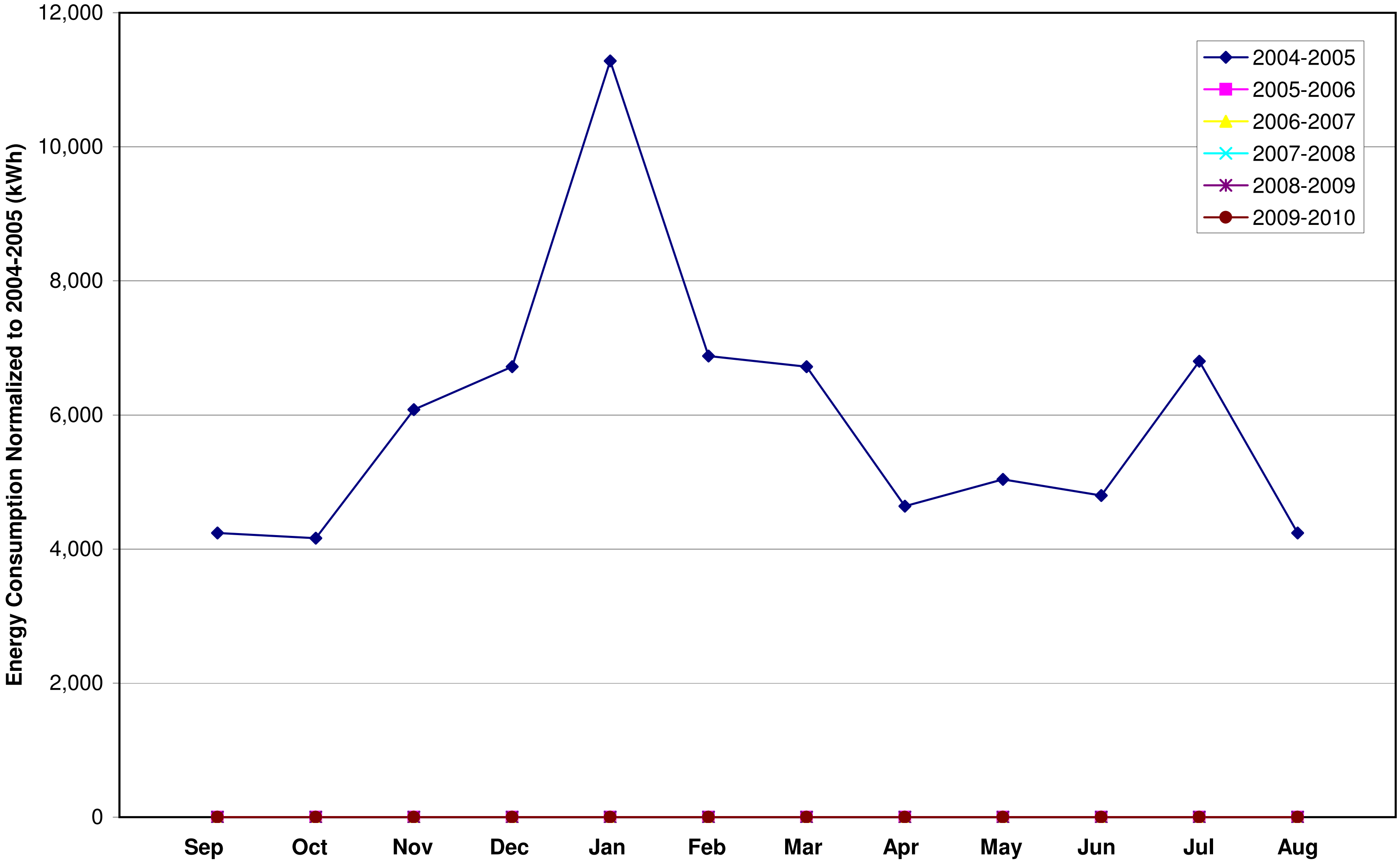


Table F.7 - Energy Consumption Monitoring Data for the Municipal Garage

	2004-2005			2007-2008			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	1,540	180.5	1,540			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	2,470	441.4	2,470			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	4,560	607.2	4,560			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	8,320	987.6	8,320			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	9,040	1165.4	9,040			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	9,940	903.9	9,940			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	7,080	828.5	7,080			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	4,190	368.8	4,190			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	2,820	278.3	2,820			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	640	96.2	640			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	390	49.9	390			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	1,250	94.9	1,250			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	52,240	6002.6	52,240	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba:

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.7 - Energy Consumption Monitoring Graph for Birtle's Municipal Garage

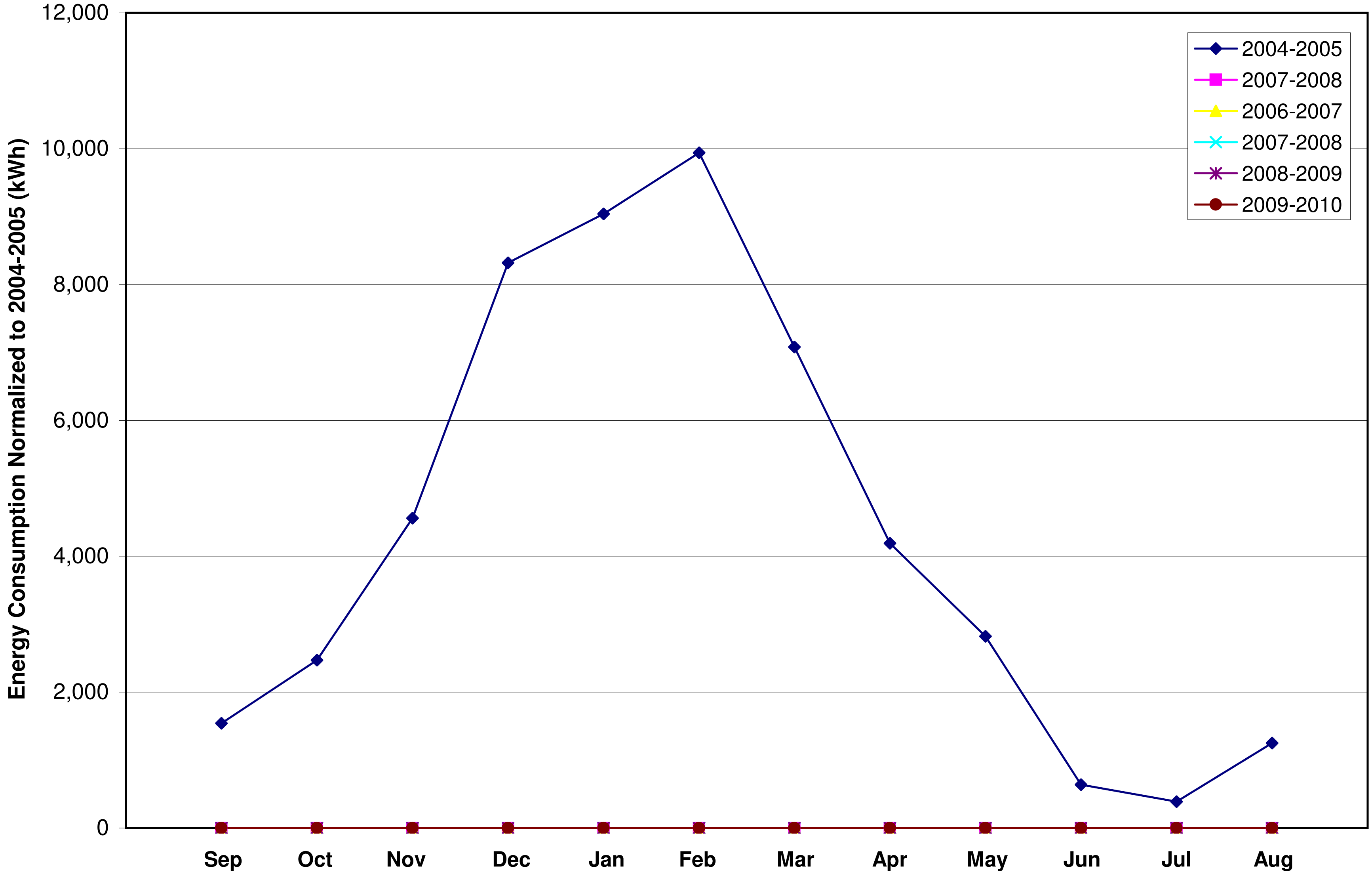


Table F.8 - Energy Consumption Monitoring Data for the Birdtail Country Museum

Month	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	780	180.5	780			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	1,970	441.4	1,970			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	2,530	607.2	2,530			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	4,520	987.6	4,520			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	9,490	1165.4	9,490			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	4,940	903.9	4,940			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	4,730	828.5	4,730			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	2,580	368.8	2,580			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	1,330	278.3	1,330			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	280	96.2	280			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	90	49.9	90			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	300	94.9	300			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	33,540	6002.6	33,540	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.8 - Energy Consumption Monitoring Graph for the Birdtail Country Museum

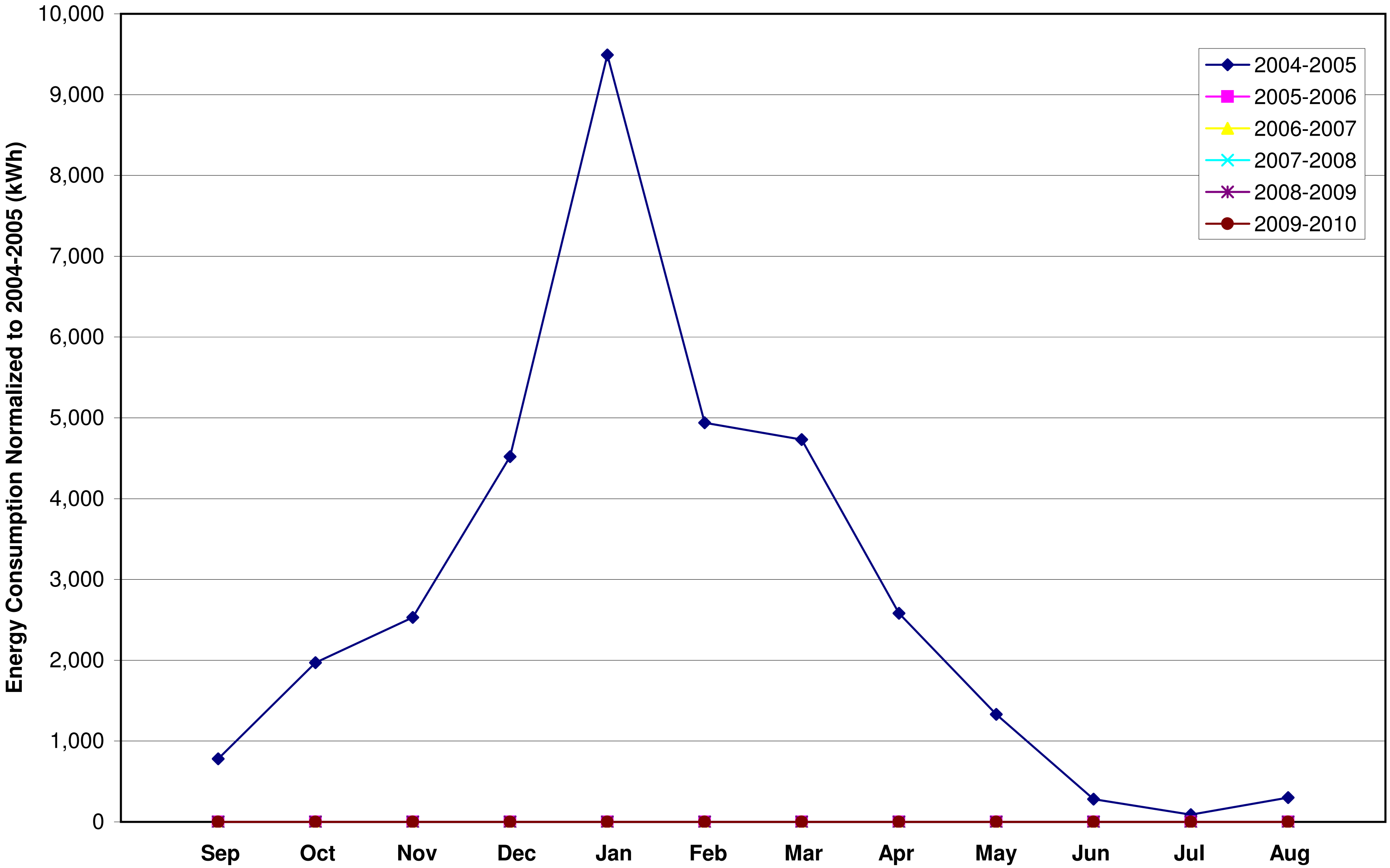


Table F.9 - Energy Consumption Monitoring Data for the Recycling Depot

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	220	180.5	220			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	0	441.4	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	890	607.2	890			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	0	987.6	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	2,110	1165.4	2,110			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	0	903.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	1,850	828.5	1,850			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	0	368.8	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	1,850	278.3	1,850			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	900	96.2	900			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	380	49.9	380			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	0	94.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	8,200	6002.6	8,200	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.9 - Energy Consumption Monitoring Graph for Birtle's Recycling Depot

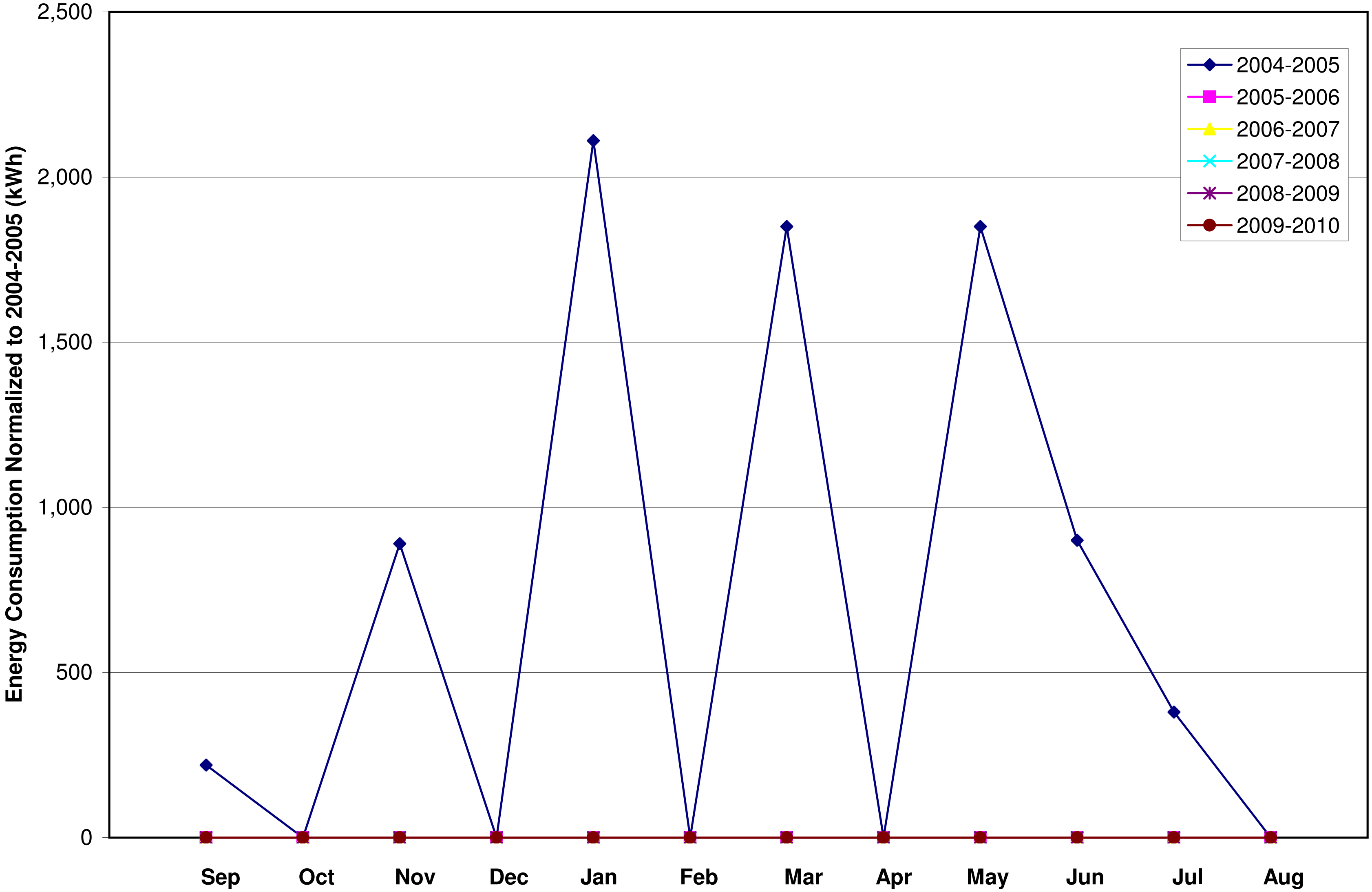


Table F.10 - Energy Consumption Monitoring Data for the Tourist Information Building

	2004-2005			2007-2008			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	0	180.5	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	4,690	441.4	4,690			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	0	607.2	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	0	987.6	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	0	1165.4	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	0	903.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	0	828.5	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	0	368.8	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	0	278.3	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	0	96.2	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	0	49.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	0	94.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	4,690	6002.6	4,690	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.10 - Energy Consumption Monitoring Graph for Birtle's Tourist Information Building

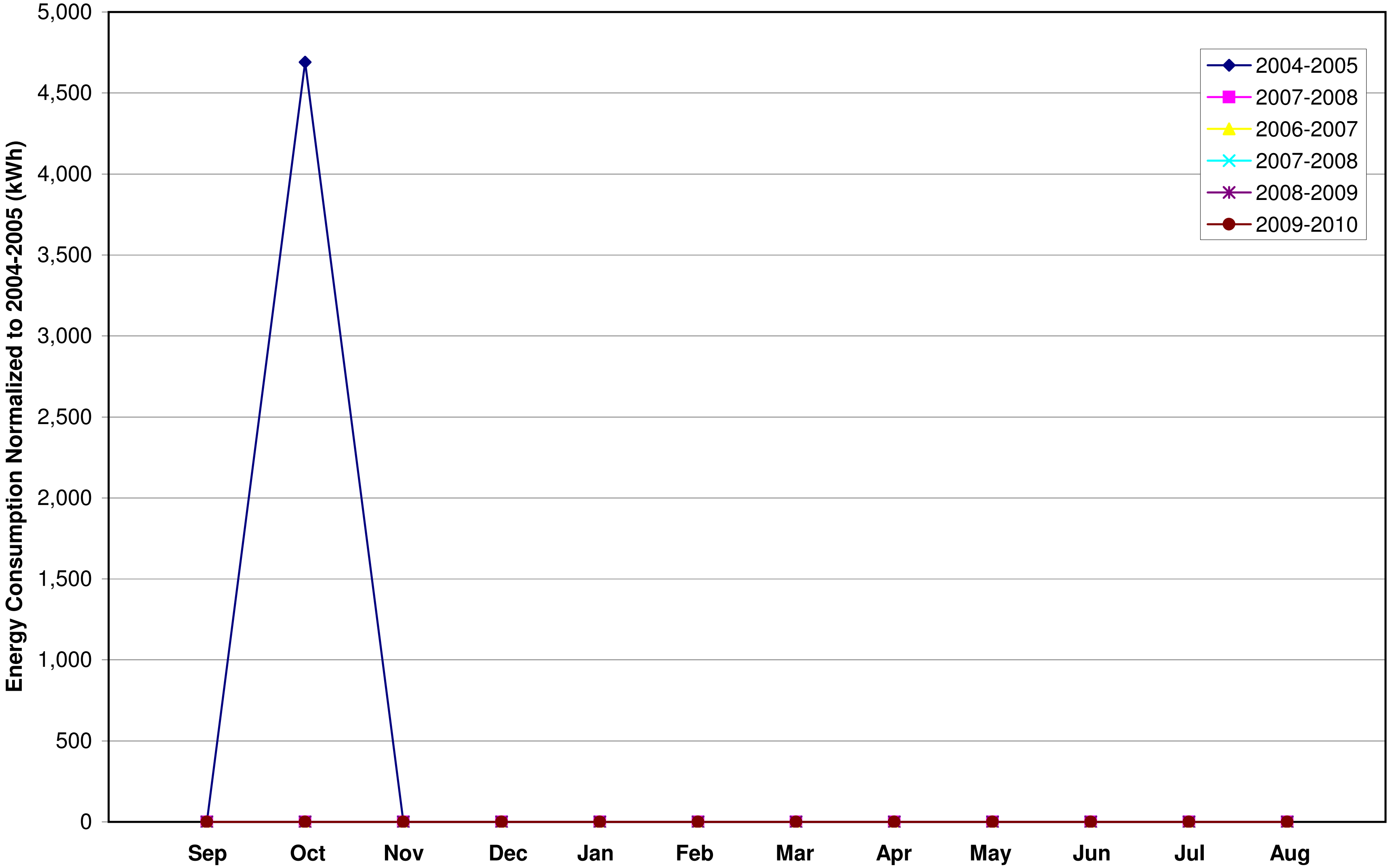


Table F.11 - Energy Consumption Monitoring Data for the Water Treatment Plant

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	7,680	180.5	7,680			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	9,500	441.4	9,500			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	11,000	607.2	11,000			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	14,700	987.6	14,700			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	15,180	1165.4	15,180			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	10,330	903.9	10,330			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	13,490	828.5	13,490			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	11,560	368.8	11,560			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	8,560	278.3	8,560			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	11,110	96.2	11,110			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	5,850	49.9	5,850			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	7,780	94.9	7,780			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	126,740	6002.6	126,740	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.11 - Energy Consumption Monitoring Graph for Birtle's Water Treatment Plant

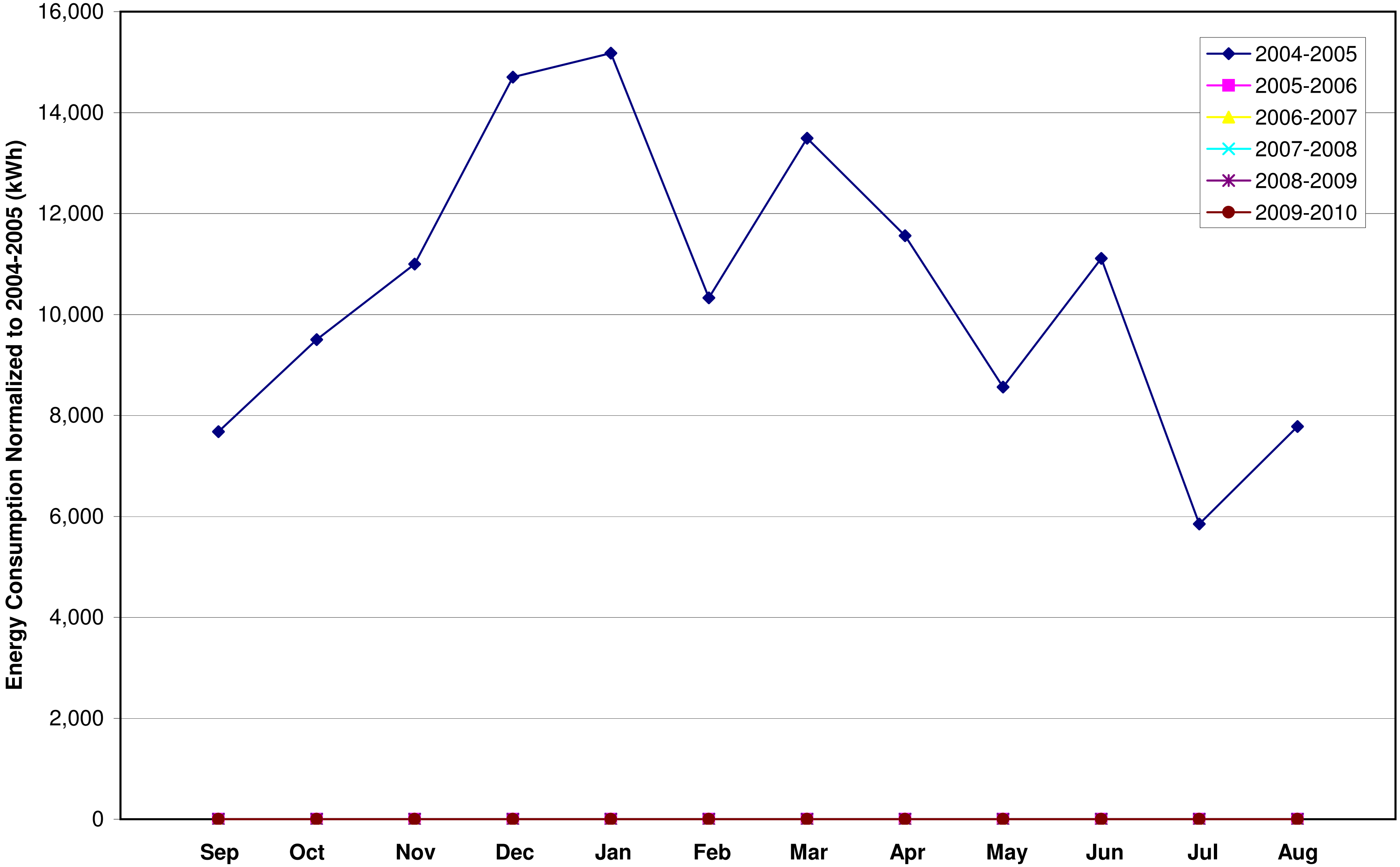


Table F.12 - Energy Consumption Monitoring Data for the Reservoir Buildings

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	4,020	180.5	4,020			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	3,290	441.4	3,290			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	5,710	607.2	5,710			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	3,980	987.6	3,980			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	7,920	1165.4	7,920			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	4,440	903.9	4,440			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	7,200	828.5	7,200			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	3,810	368.8	3,810			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	5,270	278.3	5,270			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	2,080	96.2	2,080			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	4,020	49.9	4,020			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	2,320	94.9	2,320			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	54,060	6002.6	54,060	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.12 - Energy Consumption Monitoring Graph for Birtle's Reservoir Buildings

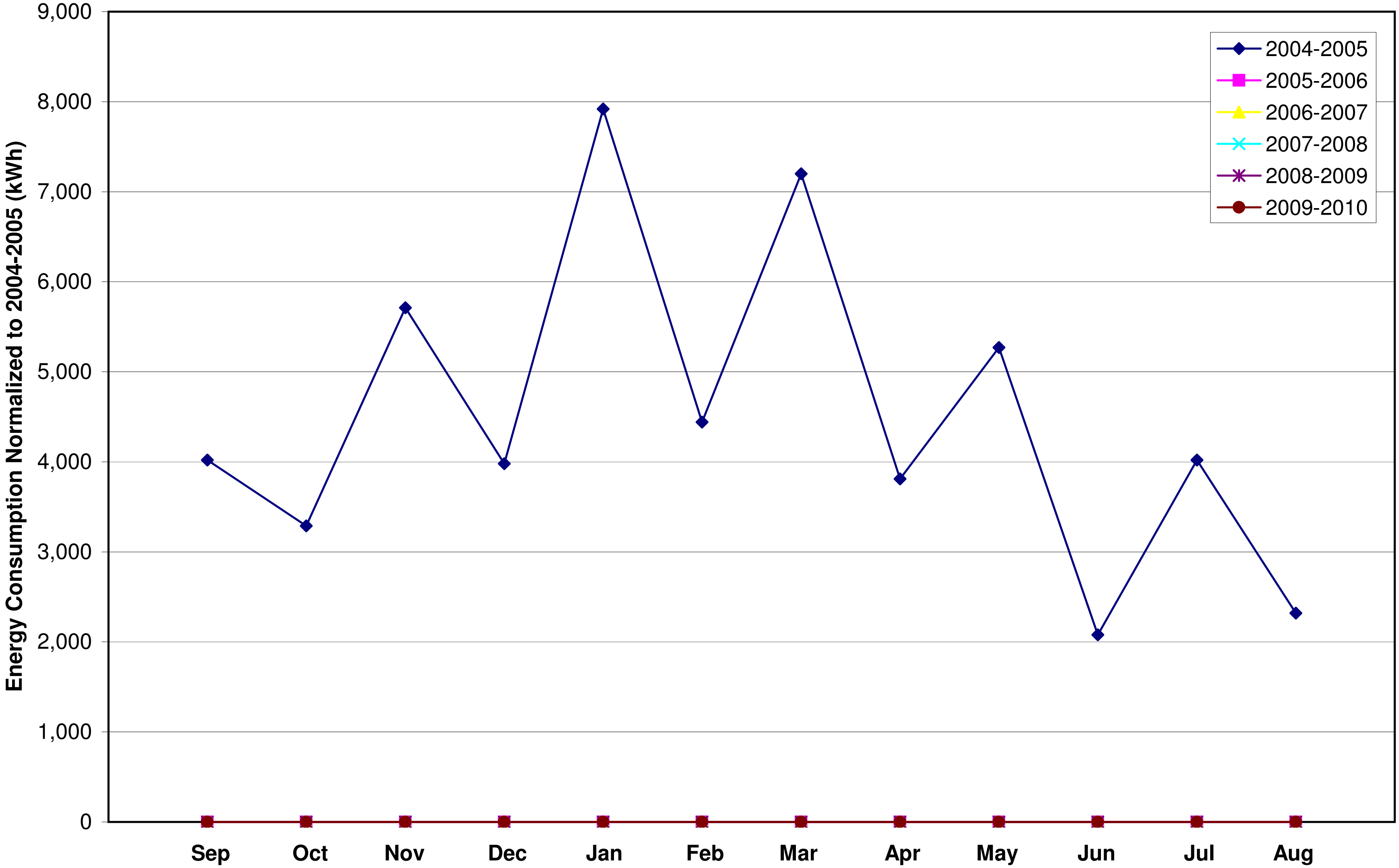


Table F.13 - Energy Consumption Monitoring Data for the North Hill Booster Station

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)	Billed Energy Consumption (kWh)	HDD (°C days/mo)	Energy Normalized to 2004-2005 (kWh)
September	2,140	180.5	2,140			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	1,620	441.4	1,620			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	1,780	607.2	1,780			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	2,220	987.6	2,220			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	3,010	1165.4	3,010			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	2,350	903.9	2,350			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	2,200	828.5	2,200			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	1,750	368.8	1,750			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	2,330	278.3	2,330			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	930	96.2	930			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	2,500	49.9	2,500			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	1,030	94.9	1,030			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	23,860	6002.6	23,860	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.13 - Energy Consumption Monitoring Graph for North Hill Booster Station

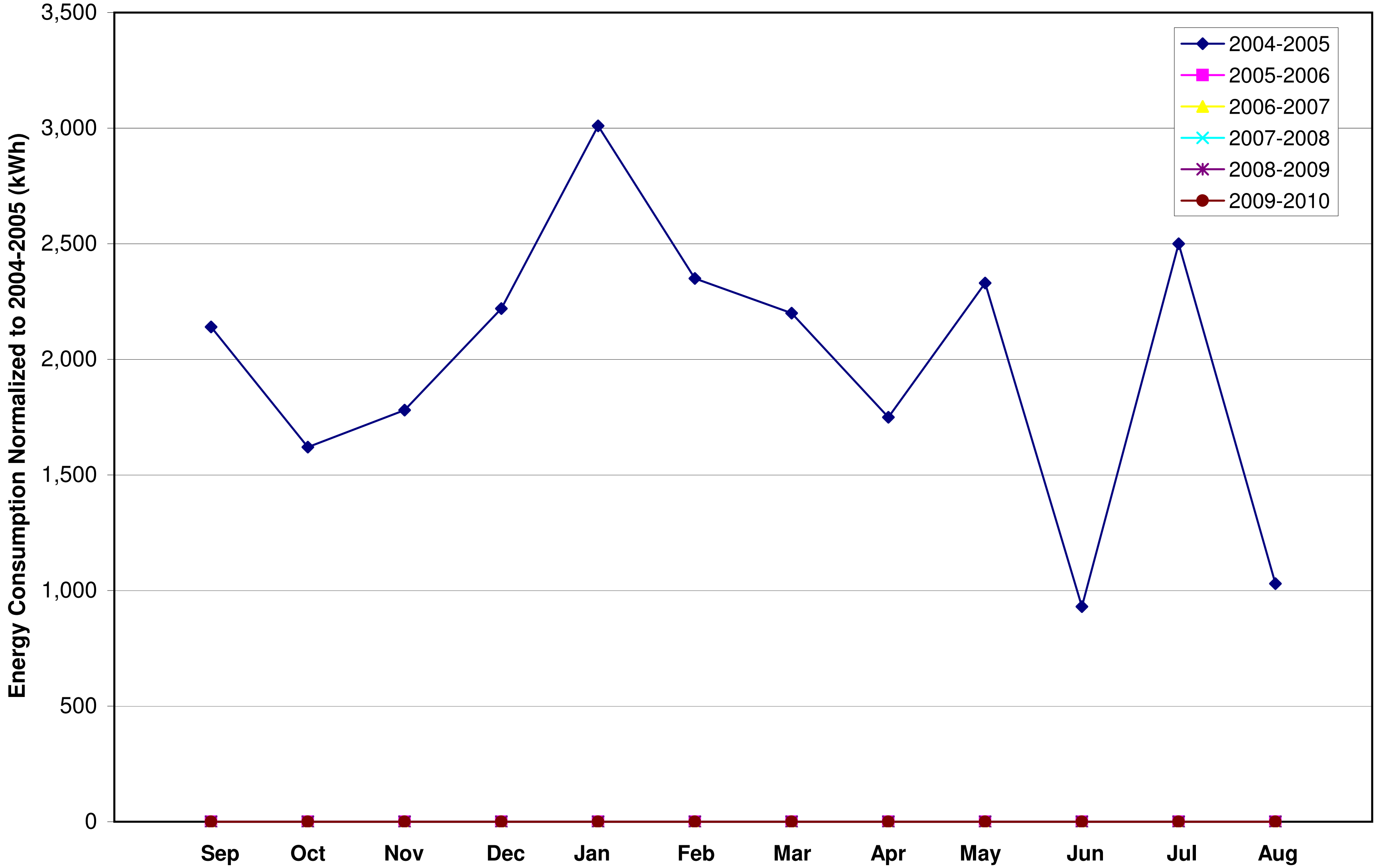


Table F.14 - Energy Consumption Monitoring Data for the South Hill Booster Station

	2004-2005			2005-2006			2006-2007			2007-2008			2008-2009			2009-2010		
Month	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Energy Consumption (kWh)**	**HDD (°C days/mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	120	180.5	120			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
October	260	441.4	260			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
November	450	607.2	450			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
December	600	987.6	600			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
January	1,010	1165.4	1,010			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
February	840	903.9	840			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
March	790	828.5	790			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
April	330	368.8	330			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
May	0	278.3	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
June	0	96.2	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
July	0	49.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
August	0	94.9	0			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!			#DIV/0!
TOTAL	4,400	6002.6	4,400	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).

2. Enter the "Billed Energy Consumption" (in kWh) taken from the hydro bill next to the appropriate month.

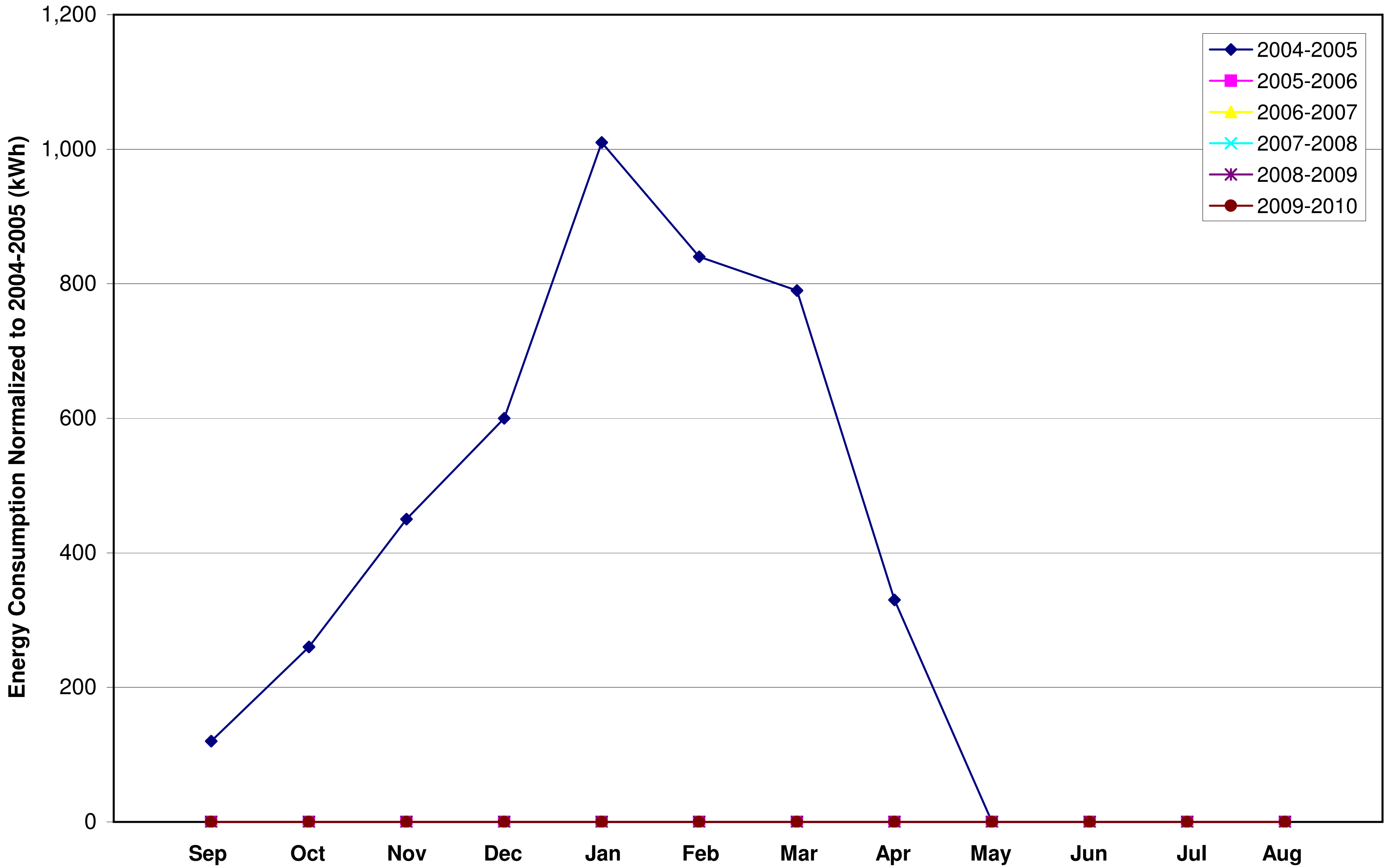
3. Go to the following website to collect information on the Heating Degree Days for Shoal Lake, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=XX&StationID=10927&Year=2005&Month=9&Day=

4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"

5. From this website, record the last number highlighted in blue (refer to page F30) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.

6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.14 - Energy Consumption Monitoring Graph for the South Hill Booster Station



Environment Canada Environnement Canada

[français] [Back]

Daily Data Report for September 2005

Notes on Data Quality.

SHOAL LAKE CS
MANITOBA

Latitude: 50° 27' N **Longitude:** 100° 36' W **Elevation:** 561.30 m
Climate ID: 5012654 **WMO ID:** 71150 **TC ID:** WUT

Daily Data Report for September 2005

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days C	Cool Deg Days C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01	18.0	6.0	12.0	6.0	0.0	1.4	0.0	1.4	0		
02	21.5	2.3	11.9	6.1	0.0	0.4	0.0	0.4	0		
03	25.7	11.5	18.6	0.0	0.6	0.0	0.0	0.0	0		
04	23.7	14.7	19.2	0.0	1.2	0.0	0.0	0.0	0		
05	25.3	12.4	18.9	0.0	0.9	0.0	0.0	0.0	0		
06	19.8	7.7	13.8	4.2	0.0	0.0	0.0	0.0	0		
07	22.2	3.0	12.6	5.4	0.0	0.0	0.0	0.0	0		
08	26.5	6.7	16.6	1.4	0.0	0.0	0.0	0.0	0		
09	25.6	15.2	20.4	0.0	2.4	0.0	0.0	0.0	0		
10	23.8	16.8	20.3	0.0	2.3	0.0	0.0	0.0	0		
11	23.3	11.0	17.2	0.8	0.0	0.0	0.0	0.0	0		
12	16.6	4.8	10.7	7.3	0.0	0.0	0.0	0.0	0		
13	14.5	4.0	9.3	8.7	0.0	0.0	0.0	0.0	0		
14	14.8	-0.2	7.3	10.7	0.0	0.4	0.0	0.4	0		
15	13.1	4.2	8.7	9.3	0.0	0.4	0.0	0.4	0		
16	10.9	4.4	7.7	10.3	0.0	0.8	0.0	0.8	0		
17	10.4	-0.2	5.1	12.9	0.0	0.6	0.0	0.6	0		
18	17.9	-1.2	8.4	9.6	0.0	0.2	0.0	0.2	0		
19	22.0	1.0	11.5	6.5	0.0	0.0	0.0	0.0	0		
20	19.9	4.5	12.2	5.8	0.0	0.0	0.0	0.0	0		
21	17.3	2.3	9.8	8.2	0.0	0.0	0.0	0.0	0		
22	16.4	-1.7	7.4	10.6	0.0	0.0	0.0	0.0	0		
23	11.2	6.7	9.0	9.0	0.0	5.0	0.0	5.0	0		
24	14.6	0.7	7.7	10.3	0.0	0.4	0.0	0.4	0		
25	16.3	-1.8	7.3	10.7	0.0	0.0	0.0	0.0	0		
26	19.4	1.9	10.7	7.3	0.0	0.0	0.0	0.0	0		
27	16.5	0.6	8.6	9.4	0.0	0.0	0.0	0.0	0		
28	11.6	-2.0	4.8	13.2	0.0	0.0	0.0	0.0	0		
29	20.1	4.7	12.4	5.6	0.0	0.0	0.0	0.0	0		
30	22.7	3.7	13.2	4.8	0.0	0.0	0.0	0.0	0		
Sum				**194.1**	**7.4**	**9.6**	**0.0**	**9.6**			
Avg	**18.7**	**4.8**	**11.8**								
Xtrm	**26.5**	**-2.0**									

Legend

[empty] = No data available
M = Missing

F30

APPENDIX G

THE MUNICIPALITIES TRADING COMPANY OF MANITOBA LTD. REPORT

TABLE OF CONTENTS - APPENDIX G

MEMBER SERVICES

The Municipalities Trading Company of Manitoba Ltd. (MTCML) allows AMM members to purchase products and services at lower prices through the power of bulk buying. This year was another great success. Sales remained consistent and the stable pool of official suppliers continued to change and grow. The products sales have consistently remained between 6.5 and 7.4 million dollars for the last 4 years.

The MTCML provides a major source of revenue for the AMM and allows the AMM membership dues to remain one of the lowest in Canada. This past year, the MTCML was able to rebate another $350,000 to our members based on their MTCML sales, bringing the cumulative rebate over the past four years to $1,250,000.

MTCML Official Suppliers

Official Suppliers are very important to the success of the MTCML. These suppliers offer hundreds of products and services that municipalities use. The Trading Company has individual contracts with each of these suppliers that ensure the best possible pricing for the purchasing members. In return, suppliers have direct contact with Manitoba's municipal market and can be a part of regular marketing opportunities through the AMM (mailings, Convention, trade shows, etc.) Each of our suppliers has shown long term commitment to the MTCML, creating a stable purchasing environment for the members of the AMM.

Corporate Members

At present fourteen companies make up the Corporate Members list of the AMM, five of these new for 2004/2005. These members assist the buying group in providing many services and hosting various events throughout the year.

*Last year, the MTCML was able to rebate **$350,000** to our members based on their MTCML sales, bringing the total rebate over the past four years to **$1,250,000**.*

Major Programs

There are also two major buying programs offered by the Trading Company. These programs are owned by the AMM membership, managed by the AMM and each administered by a company that has expertise in the program area.

Petroleum Products Buying Group (PPBG)

AMM has entered into contracts with both Imperial Oil and Petro Canada, on behalf of all of our participating Members, for the supply of gasoline, diesel and lubricants. Our objective is to combat one-sided pricing advantages enjoyed by petroleum suppliers and to assist our Members to purchase fuel at a lower cost while still supporting the local fuel dealers. Currently there are 77 AMM Members who purchase over 6,000,000 litres of fuel each year and about 130 other municipalities in Saskatchewan and Alberta who purchase an additional 29,000,000 litres of fuel annually.

The concept of AMM purchasing large volumes of fuel on behalf of our Members and the careful analysis of industry pricing means fuel savings for member municipalities in all three provinces. At the same time, local fuel dealers are supported. The program is administered by Prairie Fuel Advisors Inc., who also act as our purchasing agent.

The only cost for joining the PPBG is 1.2¢ per litre for the fuel purchased and 10¢ per litre for lubricants. A municipality may withdraw from the PPBG at any time, and there is no cost to withdraw.

MEMBER SERVICES

M.T.C.M.L.

Insurance

All AMM members outside of Winnipeg participate in the insurance program, administered by Hayhurst Elias Dudek on behalf of the AMM. Coverage includes property/road machinery and equipment; crime (loss of money); comprehensive general liability; errors and omissions liability; environmental impairment (pollution) liability; fire vehicle insurance; plus accident insurance for Councils, fire departments, ambulance services, and other 'volunteers'.

A major part of the program is the $3,500,000 annual self-insurance loss pool that keeps premiums much lower than if individual municipalities purchased their own coverage. Insurance is purchased from various providers for coverage in excess of the $3,500,000 annual loss pool amount, to provide complete protection. This allows the opportunity for significant refunds in low-claims years.

Last year, the AMM was able to offer an average 5% reduction in our insurance rates. As well, as a result of excellent risk management by municipalities, the AMM was able to refund $918,000 to municipalities out of the insurance loss pool.

Official Suppliers have shown long-term commitment to the MTCML.

MTCML Official Suppliers

Acklands Grainger Inc.
Airmaster Sales
Armtec
Bridgestone Canada Inc.
CD Awards
Darwen Road Technologies Ltd.
Denray Tire
Dust Free Road Maintenance
Fort Distributors Ltd.
Grand & Toy
Guardian Traffic Services Manitoba Ltd.
Hayhurst Elias Dudek Inc.
Kal Tire
MTS
Michelin
Norquay Printers Ltd.
PCO Orkin Swat Team
Prairie Fuel Advisors Inc.
Shippam & Associates Inc.
Souris Rock Shop
Tirecraft
Westcon Equipment & Rentals
Westman Steel Industries

AMM Corporate Members

Borland Construction
Cochrane Engineering
Guertin Equipment
Hayhurst Elias Dudek
Innovative Municipal Products Inc.
Manitoba Aboriginal and Northern Affairs
Manitoba Heavy Construction Association
Manitoba Hydro
Manitoba Mixed Concrete Association
Manitoba Pork Council
Mazer Group Construction Equipment
Robert Watson, Attorney
Strong-Coley & Associates
Westcon Equipment & Rentals Ltd.