

Regional Water Study

**Blackfalds – Lacombe – Ponoka –
Montana – Samson – Ermineskin –
Louis Bull**

Prepared for

The Communities of Blackfalds, Lacombe, and Ponoka

**The First Nations of Montana, Samson, Ermineskin, and
Louis Bull**

Prepared by

UMA Engineering Ltd.

17007 - 107 Avenue

Edmonton Alberta T5S 1G3

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1.0 Executive Summary

- The community of Blackfalds, Lacombe, and Ponoka, as well as the First Nations of Montana, Samson, Ermineskin, and Louis Bull are experiencing or expect to be experiencing problems with the quantity and quality of the water available to them from their water supply systems. All of these communities currently rely on water wells.
- This study assesses the feasibility of a Regional Water System for the Towns of Blackfalds, Lacombe, and Ponoka and also considers the possible participation of the Hobbema First Nations in this Regional System.
- Other potential users may be interested in the future. An allowance of ten percent of the non-industrial water demand by Blackfalds, Lacombe, and Ponoka, has been included in the pipeline, for possible future other users.
- The report details forecasted population and water demand growths. The average day water demand for the three Towns increases over 50 years by a factor of 3.3. For the same period, the forecasted average day water demand for the First Nations increases by a factor of 6.5. This is due to the higher forecasted population growth for the First Nations but even more so due to their expected higher urbanization rate.
- The pipeline has been designed for flows equal to 1.5 times average day flows, and for a design horizon of 50 years. Higher than 1.5 peak day demands in the communities should be addressed by local reservoirs (in the communities).
- The source of the water would be the City of Red Deer water system, or a river intake upstream of the City of Red Deer's Wastewater Treatment Plant, with a water treatment plant.
- The water treatment plant should be designed for a design horizon of 20 years.

- Applying for and obtaining a licence to withdraw water from the Red Deer River is expected to be time consuming and complex, due to existing water commitments on the Red Deer River, the need to take into account (as yet undefined) “In-Stream Flow Needs”, and the fact that the proposed Regional System would entail inter-basin water transfer by withdrawing water from the Red Deer River and discharging most of the wastewater into the Battle River System.
- According to the City of Red Deer’s Water Treatment Master Plan (2001), there is a perceived deterioration in the Red Deer River water quality, particularly with respect to organics and waterborne pathogens.
- A water treatment plant is to meet or exceed the Alberta Environmental Standards and Guidelines (1996 Revision). A conventional plant would include rapid mixing of chemicals, hydraulic flocculators, horizontal flow type sedimentation, filtration and disinfection.
- Future predesign of a water treatment plant should also include sampling and analyzing of raw water, and confirm the levels of *Cryptosporidium*. Alternate technologies such as membrane filters, ozonation, or UV radiation might then have to be considered.
- Storage of raw river water is not thought to be required initially. However, the purchase of land for the possible future addition of such storage is recommended.
- Several pipeline alignments have been considered. Two pipeline alignments are recommended; one (green) connection to the City of Red Deer, the other (green/red) to an intake upstream of the City of Red Deer’s Wastewater Treatment Plant. These alignments follow adjacent to Highway 2A and offer the most flexibility for connection to the City of Red Deer and the regional customers.
- Recommended pipeline material is PVC pipe, mostly C905, of different DRs (Dimension Ratios). Alternate pipe materials for river crossings should be considered during predesign.
- Pipeline sizes are:
 - 300 mm, 500 mm, 600 mm in the case of the three Towns only; and

- 250 mm, 350 mm, 400 mm, 450 mm, 500 mm, 600 mm in the case of the three Towns and the First Nations.
- The pipeline will be equipped with a SCADA system, for operation and control (Supervisory Control and Data Acquisition System).
- Pipeline easements of the following widths will be required:
 - Permanent Easement: 10 m
 - Working Easement: 15 m
- Pipeline booster stations will not be required until after year 20, at the earliest.
- The Red Deer Regional Water Pipeline will be classified as a major pipeline and specific testing, reporting and approvals will be required in respect to topsoil handling, restoration, and inspections by Alberta Environment and Alberta Agriculture.
- Table 1-1 summarizes the capital costs as well as the operational and maintenance costs, and the cost of water per m³ supplied to each community reservoir. Two alternates are being considered, i.e. the green alternate, connecting to the City of Red Deer and the green/red alternate, with a river intake upstream of the City of Red Deer's Wastewater Treatment Plant.

Various cost sharing possibilities are shown.

- Table 1-2 summarizes the “utility” or “rate base” method of cost calculations completed by Campbell Ryder Consulting Group Ltd. This method differs from the “cash” method since it addresses the gross and net values of utility assets and capitalization, service life of utility plant (up to 50 years for pipeline and structures) and sources of capital funding and capital structure.

The complete Campbell Ryder Consulting Group Ltd. Rate Review and Analysis is included in Appendix A.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

Table 1-1: Regional Water Study – Cost Summary

	Alternate Green				Alternate Green/Red			
	Towns Only		Towns and First Nations		Towns Only		Towns and First Nations	
	Equal	Common Parts Sharing	Oversizing by INAC	Common Parts Sharing	Equal	Common Parts Sharing	Oversizing by INAC	Common Parts Sharing
Blackfalds								
Capital Cost	\$2,175,568	\$464,199	\$2,175,568	\$351,050	\$4,873,031	\$3,161,661	\$4,873,031	\$3,083,023
Capital Cost After Grant	\$1,292,287	\$275,734	\$1,292,287	\$207,400	\$2,894,580	\$1,878,026	\$2,894,580	\$1,831,316
Cost/m ³ (¢/m ³)	Year 0: 85.6 Year 20: 70.1	Year 0: 63.8 Year 20: 60.5	Year 0: 85.6 Year 20: 70.1	Year 0: 63.4 Year 20: 61.1	Year 0: 93.6 Year 20: 45.3	Year 0: 69.0 Year 20: 38.0	Year 0: 89.6 Year 20: 44.5	Year 0: 64.7 Year 20: 37.1
Lacombe								
Capital Cost	\$7,999,193	\$6,056,925	\$7,999,193	\$4,976,389	\$17,917,301	\$15,975,034	\$17,917,301	\$14,618,983
Capital Cost After Grant	\$4,751,521	\$3,597,813	\$4,751,521	\$2,940,051	\$10,642,877	\$9,489,170	\$10,642,877	\$8,683,676
Cost/m ³ (¢/m ³)	Year 0: 85.6 Year 20: 70.1	Year 0: 84.6 Year 20: 66.6	Year 0: 85.6 Year 20: 70.1	Year 0: 70.3 Year 20: 67.2	Year 0: 93.6 Year 20: 45.3	Year 0: 1.10 Year 20: 90.0	Year 0: 89.6 Year 20: 44.5	Year 0: 99.1 Year 20: 37.7
Ponoka								
Capital Cost	\$3,090,899	\$6,744,535	\$3,090,899	\$5,219,626	\$6,923,269	\$10,526,905	\$6,923,269	\$8,570,043
Capital Cost After Grant	\$1,835,994	\$4,006,254	\$1,835,994	\$3,083,755	\$4,112,422	\$6,282,682	\$4,112,422	\$5,090,606
Cost/m ³ (¢/m ³)	Year 0: 85.6 Year 20: 70.1	Year 0: 97.6 Year 20: 87.1	Year 0: 85.6 Year 20: 70.1	Year 0: 88.6 Year 20: 80.4	Year 0: 93.6 Year 20: 45.3	Year 0: 85.0 Year 20: 65.0	Year 0: 89.6 Year 20: 44.5	Year 0: 70.1 Year 20: 55.7
First Nations								
Capital Cost	N/A	N/A	\$10,242,819	\$12,961,414	N/A	N/A	\$13,794,919	\$17,236,471
Cost/m ³ (¢/m ³)	N/A	N/A	Year 0: 58.8 Year 20: 57.6	Year 0: 59.0 Year 20: 57.6	N/A	N/A	Year 0: 39.8 Year 20: 17.9	Year 0: 39.8 Year 20: 17.9
No Capital Debenture Costs								

- NOTE:
- 1) Capital costs after grant for Towns are based on an average 40.60% grants.
 - 2) No allowance is made for capital reserve funds or return on equity for the pipeline, water treatment plant and other major components of the system.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

Table 1-2: Summary of Costs – Utility/Rate Base Method

	Year 1 \$/m ³	Year 2 \$/m ³	Year 3 \$/m ³	Year 4 \$/m ³	Year 5 \$/m ³	Year 6 \$/m ³	Year 7 \$/m ³	Year 8 \$/m ³	Year 9 \$/m ³	Year 10 \$/m ³
Option 1 – Base Case/Green Alternate/City of Red Deer Supply	0.788	0.758	0.734	0.728	0.723	0.717	0.713	0.708	0.702	0.696
Option 2 – Water Treatment Plant/Green/Red Alternate	0.813	0.726	0.657	0.641	0.626	0.612	0.600	0.589	0.572	0.558
Option 3 – Base Case + First Nations/Green Alternate/City of Red Deer Supply	0.754	0.732	0.714	0.707	0.701	0.696	0.690	0.686	0.681	0.676
Option 4 – Water Treatment Plant + First Nations/Green/Red Alternate	0.693	0.627	0.572	0.552	0.532	0.518	0.504	0.492	0.478	0.466

2.0 Introduction and Background

The Communities of Blackfalds, Lacombe, and Ponoka, and the First Nations of Montana, Samson, Ermineskin, and Louis Bull are reviewing the quantity and quality of the water available to them from their water supply systems. All of these communities currently rely on water wells and there are concerns about the long availability of water.

Blackfalds has three active wells. Two wells are high in H₂S and fluoride. The other wells water is low in fluoride but harder. Currently, mixing of the water is carried out to attempt to meet Canadian Drinking Water Standards for fluoride.

Blackfalds

The Town's Master Plan indicates that *"no additional available wells have been identified that can be added economically to the supply system beyond 4,700 people"*.

Lacombe has seven active wells plus two wells at the college. A groundwater investigation and well drilling program is currently underway. It had been estimated that the aquifer in Lacombe is capable of supporting a population of 12,000. This does indicate that planning for new water sources is required. Recent developments, with the potential for food processing plants (with high water demands) being established in Lacombe in the very near future, make the need for new water sources all the more urgent.

Lacombe

Ponoka has eight active wells. Four wells serve the Central Treatment Plant, and the other four wells serve the Lucas Heights Treatment Plant. Treatments consist of aeration and manganese greensand filtration, as well as, in the case of the Lucas Heights Treatment Plant, lime softening and recarbonation. The water production rate from the water treatment plants does not satisfy current peak day consumption. There is an immediate need for either increased treated water storage or increased treatment capacity. There is also a need to review future water demands and water sources.

Ponoka

Ermineskin has been experiencing shortages of water due to biofouling of some wells. Hauling of water has been necessary. In addition, expected population increases as well as increasing water demands per capita make it necessary to look at other potential sources of water.

Ermineskin and
Other First
Nations

3.0 Potential Regional Water System Users

Users of the Regional Water System will include:

- all the users within the Town Limits of Blackfalds, Lacombe, and Ponoka, including residential, commercial, and industrial users;
- all the users within the reserves of the First Nations of Montana, Samson, Ermineskin, and Louis Bull, including urban users and rural users. Urban users will obtain water through piped systems, rural users through trucking or via trickle feed systems;
- other potential users might be: interested parties in the Counties of Red Deer, Lacombe, and Ponoka. The Counties expressed some interest in a Regional Water System, the County of Red Deer more than others. Potential future users may include:
 - County of Red Deer
 - Burnt Lake Business Park
 - Central Park Area between Highways 2 and 2A (includes IPSCO)
 - Blindman Industrial Area and Norm Chiles Industrial Area east of Highway 2A
 - County of Lacombe
 - Morningside, residential, current population 109
 - Milton Residential Area northeast of Lacombe
 - County Residential: Greystones Subdivision northeast of Blackfalds and planned between C&E Trail and Highway 2A
 - County Residential: planned on east side of Lacombe Lake and on Johnson property between C&E Trail and Highway 2A
 - Burbank Area Residential
 - Burbank Area Industrial
 - County of Ponoka
 - Intensive livestock operations north of Ponoka
 - Morning Meadows Subdivision west of Highway 2

Potential Future
Users

- NOTE: the County was interested in a Regional System in 1996, when Epcor (Aqualta) was looking at supplying water to the City and County of Wetaskiwin, Millet, Town and County of Ponoka, County of Leduc, and County of Camrose. At the time, Maple Leaf Meats were considering a possible plant in Ponoka County, with a water requirement larger than the whole flow of the Battle River.

For purposes of this study, the following users have been taken into account:

- Blackfalds,
- Lacombe,
- Ponoka,
- Other users:
 - an allowance of 10% of the total non-industrial water demand of Blackfalds, Lacombe, and Ponoka together, to represent other users,
- Montana,
- Samson,
- Ermineskin, and
- Louis Bull.

4.0 Population and Water Usage Projections

4.1 POPULATION PROJECTIONS

Blackfalds

Population 2001:	3,300 people
Growth 2001-2004:	4,300 people
Assumed Growth thereafter:	2.35% (for 51 years). This growth rate is in accordance with Blackfalds' Master Plan (May 2000).

Lacombe

Population 2001:	9,232 people
Growth 2001-2004:	12,232 people
Assumed Growth thereafter:	3% until 2010 and 1.5% (for 41 years)

Ponoka

Population Fall 1996:	6,149
Estimated Population Fall 2000:	6,703
Assumed Growth thereafter:	1.5% (for 51 years)

Montana

Population On-reserve 2001:	564, of which 102 urban and 462 rural
Assumed Growth thereafter:	3% (for 50 years)

Samson

Population On-reserve 2001:	4,845, of which an estimated 1,453 urban and 3,392 rural
Assumed Growth thereafter:	3% (for 50 years)

Ermineskin

Population On-reserve 2001: 2,282, of which an estimated 500 urban and 1,782 rural
Assumed Growth thereafter: 3% (for 50 years)

Louis Bull

Population On-reserve 2001: 1,201, of which an estimated 673 urban and 528 rural
Assumed Growth thereafter: 3% (for 50 years)

NOTE: For the First Nations, it is assumed that 80% of all population growth will be located in an urban area, with the balance in a rural area. This is in accordance with the Samson First Nation official policy.

First Nations 80%
of Population
Growth Assumed
in Urban Areas

Table 4-1 below summarizes the population projections used in this study.

Table 4-1: Population Projections

	Year 0 2001		Year 10 2011		Year 20 2021		Year 50 2051	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Blackfalds	3,300		5,059		6,382		12,811	
Lacombe	9,232		14,825		17,205		26,892	
Ponoka	6,703		7,779		9,028		14,110	
Montana	102	462	257	501	466	553	1,629	844
Samson	1,453	3,392	2,786	3,725	4,577	4,174	14,569	6,671
Ermineskin	500	1,782	1,128	1,939	1,972	2,150	6,678	3,326
Louis Bull	673	528	1,003	611	1,447	722	3,924	1,341
	21,963	6,164	32,837	6,776	41,077	7,599	80,613	12,182
	28,127		39,613		48,676		92,795	

4.2 WATER DEMAND PROJECTIONS

For the Towns of Blackfalds, Ponoka, and Lacombe, a total demand per capita per day of 370 Lpcpd has been used in this study.

As a correction to the above, an allowance for industrial water demand has been added for the Town of Lacombe.

For the First Nations of Montana, Samson, Ermineskin, and Louis Bull, a total demand per capita per day of 370 Lpcpd has been used for the urban part of the reserves; for the rural areas, a total demand per capita per day of 180 Lpcpd has been used. It is assumed that the rural areas will be served through trucking or through a trickle feed system from the central reservoir.

Based on the populations shown in Section 4.1, the average day water demand evolution is as shown in Table 4-2.

Table 4-2: Evolution of Average Day Water Demands (L/s)

	Year 0 2001	Year 10 2011	Year 20 2021	Year 50 2051
Blackfalds	14.1	21.7	27.3	54.9
Lacombe	39.5	63.5	73.7	115.2
Lacombe Industrial	0.0	40.0	40.0	40.0
Ponoka	28.7	33.3	38.7	60.4
Montana	0.9	2.1	3.2	7.4
Samson	9.6	19.7	28.3	65.2
Ermineskin	4.5	8.8	12.9	30.3
Louis Bull	3.5	5.6	7.7	16.9
TOTAL	100.8	194.7	231.8	390.3

Please note that, in Table 4-2, the water demands for the initial year 2001, for the First Nations, have been based on 370 Lpcpd for the urban population and 90 Lpcpd for the rural population. For later years, the rural water demand was increased to 180 Lpcpd.

Please also note the allowance of 40 L/s (or 3,456 m³/day) for Lacombe's Industrial Area. This quantity is subject to further review and is based on a graduated demand, i.e. 15 L/s – 2004, 20 L/s – 2006, 40 L/s – 2011.

For the design of the pipeline, users other than the above are also taken into account; these are the other potential users discussed in Section 3.0. For this study, it has been assumed that their demand is spread along the pipeline and equals 10% of the demands of Blackfalds, Ponoka, and Lacombe, excluding the industrial demand in Lacombe.

Table 4-3 shows the evolution of the average day demand, including other demands.

Table 4-3: Evolution of Average Day Demands, Including Other Demands (L/s)

	Year 0 2001	Year 10 2011	Year 20 2021	Year 50 2051
Blackfalds	14.1	21.7	27.3	54.9
Lacombe	39.5	63.5	73.7	115.2
Lacombe Industrial	0.0	40.0	40.0	40.0
Ponoka	28.7	33.3	38.7	60.4
Allowance for Other Demands	8.2	11.9	14.0	23.1
Montana	0.9	2.1	3.2	7.4
Samson	9.6	19.7	28.3	65.2
Ermineskin	4.5	8.8	12.9	30.3
Louis Bull	3.5	5.6	7.7	16.9
TOTAL	109.0	206.6	245.8	413.4

It is further recommended that the pipeline be designed for flows equal to 1.5 times the average day demands.

Peak day demands in the various communities may well exceed 1.5 times the average demands (for example, in Lacombe, the peak day factor is approximately 1.6). It is the intent that sufficient storage be provided in each community to be able to supply the difference between the actual peak day demand and the amount supplied by the pipeline, i.e. 1.5 times average day.

It should be noted that the above does not apply to the industrial demand in Lacombe. The maximum day for this demand is estimated at 40.0 L/s and will be provided by the pipeline.

Table 4-4 shows the evolution of the design flows (based on 1.5 times average day demands) of the pipeline.

Table 4-4: Pipeline Design Flows (L/s) (1.5 Times Average Day)

	Year 0 2001	Year 10 2011	Year 20 2021	Year 50 2051
Blackfalds	21.2	32.6	41.0	82.4
Lacombe	59.3	95.3	110.6	172.8
Lacombe Industrial	0.0	40.0	40.0	40.0
Ponoka	43.1	50.0	58.1	90.6
Allowance for Other Demands	12.3	17.9	21.0	34.7
Montana	1.4	3.2	4.8	11.1
Samson	14.4	29.6	42.5	97.8
Ermineskin	6.8	13.2	19.4	45.5
Louis Bull	5.3	8.4	11.6	25.4
TOTAL	163.8	290.2	349.0	600.3

5.0 Philosophy for Sizing and Upgrading of Major System Components

5.1 SYSTEM COMPONENTS

The major system components are:

- Red Deer River Water Intake (if any),
- Low Lift Station (to pump from river intake to water treatment plant),
- Water Treatment Plant (if any),
- High Lift Station (if any),
- Pipeline, and
- Booster Stations.

5.2 PHILOSOPHY FOR SIZING AND UPGRADING OF COMPONENTS

For the river intake and low lift station structure, at the river, a design horizon of 50 years is selected. The reason for this is that a large proportion of the cost is fixed, and related to the difficult construction in the river and the deep excavation adjacent to the river for the low lift station.

50 Year Design
Horizon for River
Intake and Low
Lift Station
Structure

Pumps inside the low lift station would be sized for the 10 year horizon. To meet the 20 year horizon, impellers and motors would be changed. To meet the 50 year horizon, larger pumps and motors would be installed.

The water treatment plant would be sized for 20 years, on an area of land large enough to accommodate an expanded plant (for the 50 year horizon). The 50 year horizon would be met by expanding the plant.

20 Year Design
Horizon for WTP

The high lift station, usually located inside the water treatment plant, would be designed such that it has adequate space for 20 years. The initial high lift pumps would be designed for the 10 year horizon, and upgraded through larger impellers and motors for the 20 year horizon. The 50 year horizon would be met through expansion of the high lift station.

For the pipeline, a design horizon of 50 years has been selected. It should be noted that the evolution over 50 years of the average day water demand is very different for the three Towns than for the four First Nations. The average day water demand for the three Towns (Table 4-2) increases from 82.3 L/s to 270.5 L/s, a factor of 3.3. Over the same period, the water demand for the First Nations is shown to increase from 18.5 L/s to 119.80 L/s, a factor of 6.5. To design a pipeline for an increase in flow as high as 6.5 is very unusual. Therefore, consideration could be given to designing the portion of the pipeline from Ponoka to Ermineskin for a 20 year design period only (during which period First Nation demand would increase from 18.5 L/s to 52.1 L/s, a factor of 2.8), and to turn this portion of the pipeline in the future, if and when the flows exceed the design flows. Such an approach would lead to lower initial pipeline costs for the First Nations.

**50 Year Design
Horizon for
Pipeline**

For purposes of this study, however, a 50 year design horizon for the total length of the pipeline, for the 50 year pipeline design flows as shown in Table 4-4, has been adopted.

The system also contains a booster station to make the water move through the pipeline. As will be seen later, such a booster station would be required at Ponoka after year 20, to move the water to the First Nations.

Table 5-1 summarizes the sizing philosophy for the major system components.

Table 5-1: Basis of Sizing of Major System Components

System Component	Design Horizon
River Intake and Low Lift Station at River: Structures	50 years
Pumps in Low Lift Station	10 years
- to meet 20 Year Horizon: Larger Impellers and Motors	
- to meet 50 Year Horizon: Change Pumps and Motors	
Water Treatment Plant to meet 50 Year Horizon: Expand Plant	20 years
High Lift Pump Station	10 years
- to meet 20 Year Horizon: Larger Impellers and Motors	
- to meet 50 Year Horizon: Change Pumps and Motors	
Pipeline	50 years

6.0 Water Source Options

6.1 CONNECTION TO CITY OF RED DEER

A connection to the Water Distribution System of the City of Red Deer is possible, and is further shown in this study as the “green” alternative. The connection would be at the intersection of Gaetz Avenue (Highway 2A) and Highway 11A. Treated water from the City of Red Deer’s system would enter the pipeline under pressure. It should be noted that, in its rates, the City of Red Deer has assumed a dedicated line, within City Limits, to connect the regional pipeline to the Glendale Reservoir.

UMA had requested the City of Red Deer to advise at what pressures the water can be delivered. Although no official response has been received, for purposes of this study, it is assumed that the water can be supplied at a hydraulic grade of 914.0 m.

Advantages of connecting to the City of Red Deer are as follows:

Advantages

- results in a simpler Regional System:
 - no new river intake and low lift station required, and
 - no new water treatment plant and high lift station required;
- minimal staff required to operate Regional System;
- obtaining licence to withdraw water will likely be more straightforward, as City of Red Deer already has an existing licence; and
- existing experienced water treatment plant operators.

Other considerations will be:

- the cost per cubic metre of water to the Regional System.

6.2 RED DEER RIVER AND NEW WATER TREATMENT PLANT

The other possibility is building a new river intake on the Red Deer River, with a low lift station to pump the water to a water treatment plant, and to pump the treated water further from the water treatment plant to the regional pipeline.

When Alberta Environment reviews an application for a licence, they also look at the historical natural minimum flow. Again, based on the flow records at WSC 05CC002 (Red Deer River at Red Deer), the mean minimum flow was 5.44 m³/s between 1913 and 1982 inclusive, and can be taken to be the main minimum natural flow rate that is used by Alberta Environment when they review an application.

Minimum Natural Flow

Yearly withdrawals, in m³/s, for the Regional System are estimated to be as follows:

Yearly Withdrawal by the Regional System

	Blackfalds – Lacombe – Ponoka	First Nations	Total
Year 2001	0.08	0.02	0.10
Year 2011	0.16	0.03	0.19
Year 2021	0.17	0.06	0.23
Year 2051	0.27	0.12	0.39

- No magnitude of the in-stream flow need is available at this time but a report on this is expected sometime this year. In the absence of any better information, it has been suggested that the magnitude of the in-stream flow need is in the order of 16 m³/s during the winter months and 20-25 m³/s during the summer months. The applicability of the suggested winter in-stream flow need is questionable, as it is close to three times larger than the mean minimum flow (5.44 m³/s) before the construction of the Dickson Dam. As the intent with the in-stream flow need is to preserve the natural aquatic conditions, the mean minimum natural flow (5.44 m³/s) seems to be more appropriate than the 16 m³/s winter months flow suggested by Alberta Environment.
- A Regional Water System may have to consider sufficient raw water storage capacity to cover potential periods during which the release from the Dickson Dam is low.

Conclusions

6.2.2 Raw Water Quality

The predesign report of the Stettler Water Treatment Plant (1982) notes that:

“Generally, the Red Deer River is a good quality water source. Water quality parameters affecting water treatment considerations include turbidity, suspended solids, colour, hardness and bacterial/viruses. . . . Conventional water treatment technology is adequate to ensure that the above parameters comply with the Guidelines for Canadian Drinking Water Quality, 1978. This is substantiated by extensive operating experience at three water treatment plants on the Red Deer River.”

No water sampling was done on the river, but the following information was obtained from the City of Red Deer’s Water Treatment Master Plan (Associated Engineering, February 2001).

- *The raw water is subject to flashy turbidity during spring runoff. Turbidity varies from lows of 1 to 3 NTU in the winter months to 3 to 130 NTU during spring. Turbidity during spring breakup is generally low, with flashy spikes over 100 NTU.*
- *Pathogenic protozoa data are as follows:*

<i>Pathogen</i>	<i>Units</i>	<i>Min. Value</i>	<i>Max. Value</i>	<i>Geometric Mean</i>
<i>Giardia</i>	<i>per 100 L</i>	<i>7</i>	<i>1,400</i>	<i>300</i>
<i>Cryptosporidium</i>	<i>per 100 L</i>	<i>0</i>	<i>4,700</i>	<i>80-180</i>

- *There is a perceived deterioration in the Red Deer River water quality, particularly with respect to organics and waterborne pathogens. Increased activity in the watershed – livestock farming, logging and municipal water discharges are all believed to be contributing to the deteriorating water quality. This situation is not unique to the Red Deer River, and the Alberta Government has a role to play in developing comprehensive watershed management programs that bring all issues to the table. It is important the City becomes more actively involved in watershed management to encourage initiatives that will improve the Red Deer River water quality.*

City of Red Deer:
Raw Water Quality

Any treatment plant will have to consider the levels of *Giardia* and *Cryptosporidium* in the raw water.

The current Alberta Environment standards address *Giardia*, and require a 5.5 log removal/inactivation for the *Giardia* levels in the raw water, noted above. A conventional treatment plant with chlorine disinfection will be able to achieve this.

The current Alberta Environment standards do not address *Cryptosporidium*, although the USEPA requires a minimum 2 log removal. Considering the levels of *Cryptosporidium* in the raw water however, a removal efficiency of 4 log to 6.5 log may be required. This level of removal can not normally be achieved by a conventional treatment plant with chlorine disinfection.

The future predesign of a water treatment plant should thus consider other technologies, such as membrane filters, ozonation or the addition of UV irradiation of filtered water, to achieve the required removal levels of *Cryptosporidium*.

The City of Red Deer, for its water treatment plant, is planning along these same lines.

6.2.3 Existing Intakes: Union Carbide (Dow)

Consideration was given to the possibility of requesting the shared use of existing water intakes on the Red Deer River.

The only existing intake close enough to Blackfalds and Lacombe to warrant consideration is the one owned by Union Carbide (now a subsidiary of Dow Chemical Company).

Current information on the intake includes the following:

- The intake is located at NW 9-39-26-W4M.
- The licensed withdrawal rate is 3,632 acre feet per year, or 4,480,000 m³ per year.
- From information obtained from Union Carbide, the capacity of the intake is estimated at some 750 m³/hr. (6,570,000 m³ per year).
- Actual withdrawal in 1999 was 3,548,722 m³.

- Union Carbide also indicated that additional capacity may be required should an additional plant be constructed on the site.

Considering that the 10, 20, and 50 year withdrawals required for the Regional System alone, are 6,500,000 m³, 7,752,000 m³, and 13,037,000 m³, sharing the existing Union Carbide intake is not a possibility. This intake is too small.

7.0 Pipeline Alignment Options and Preferred Alignment

7.1 PIPELINE ALIGNMENT OPTIONS

Several pipeline alignments have been considered during the course of this study, four of which are shown on Figure 7.1. These four alignments can be described as follows:

- A “green” alignment connecting to the City of Red Deer’s distribution system at Highway 2A and Highway 11A, then north and across the Blindman River into Blackfalds, following the railway alignment through Blackfalds and further to the southern edges of Lacombe. Here the alignment turns east, and then north, to pass Lacombe on the east side, until it hits the railway alignment north of Lacombe again. From there the alignment follows the CPR alignment into Ponoka; the alignment is between the CPR and the Battle River going through Ponoka, and further follows the CPR to when it enters the Ermineskin Indian Reserve.
- A “blue” alignment starts from a river intake located on the Red Deer River about 1.5 km upstream of the City’s wastewater treatment plant. It then goes northeast through Red Deer County and then north, to cross the Red Deer River at a location about 1.5 km upstream of the Union Carbide water intake. From there, there is a branch-off westward towards Blackfalds, while the main line continues straight north, passing Lacombe just east of the existing lagoons, to meet the CPR north of Lacombe. From there the alignment is the same as for the “green” alignment (above) to the Ermineskin Indian Reserve.
- A “pink” alignment starts from a river intake located about 18 km downstream of the City of Red Deer’s wastewater treatment plant, and about 4 km downstream of the mouth of the Blindman River into the Red Deer River. This alignment is otherwise the same as the “blue” alignment above.

Green Alignment

Blue Alignment

Pink Alignment

- A “cyan” alignment starts from a river intake located upstream of the City of Red Deer, then going north to the west of the City, through the Burnt Lake area, then following Highway 2 and across the Blindman River, to Highway 597. There the alignment turns east, entering Blackfalds, and, once it hits the CPR alignment, following the same route as the “green” alignment, all the way to the Ermineskin Indian Reserve.
- A “green/red” alignment starts from a river intake immediately upstream of the Red Deer Wastewater Treatment Plant and proceeds on the south side of the Treatment Plant to the Chiles Industrial Area. The alignment then connects to the “green” alignment at Highway 2A and Highway 11A. The alignment is approximately 2.4 km longer than the “green” alignment and would be utilized if the regional water group were to construct their own water treatment plant.

Cyan Alignment

**Green/Red
Alignment**

Other alignments which had been considered in the study, but which were abandoned, include a river intake just upstream of the mouth of the Blindman River into the Red Deer River. Because of the difficult access to the riverbank in this area, the location close (13 km) to and downstream of the City of Red Deer’s wastewater treatment plant, and the difficulty of building a pipeline through the nearby Burbanks area, these alignments were abandoned.

7.2 PREFERRED ALIGNMENTS

The “green” alignment is the only one directly connecting to the City of Red Deer’s water system. As such, it will need to be compared with the best of the three other alignments, each of which has its own intake and water treatment plant.

The advantages and disadvantages of the three alignments with river intake in this report, not considering cost, are shown in Table 7-1.

**Advantages and
Disadvantages**

**Table 7-1: Advantages and Disadvantages of Pipeline Alignments -
Pipeline Alignments with River Intake**

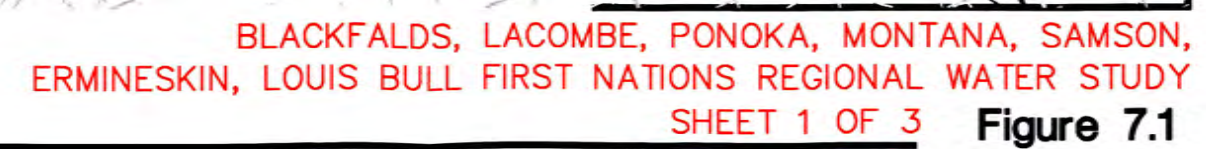
	“Blue” Alignment	“Pink” Alignment	“Cyan” Alignment	“Green/Red” Alignment
Advantages	Intake upstream of City’s WWTP	--	Intake upstream of City’s WWTP	Intake upstream of City’s WWTP
	Shorter than Cyan Alignment	Shortest	--	Alignment is close to Town of Blackfalds
	--	Relatively easy access to river	--	Allows option of either connection to City or new water treatment plant
Disadvantages	--	Intake downstream of City’s WWTP	--	
	--	--	Very long, longest Area near river marshy; difficult construction	Construction in industrial and WWTP area will be more difficult and likely higher land costs
	--	--	Burnt Lake area land expensive	

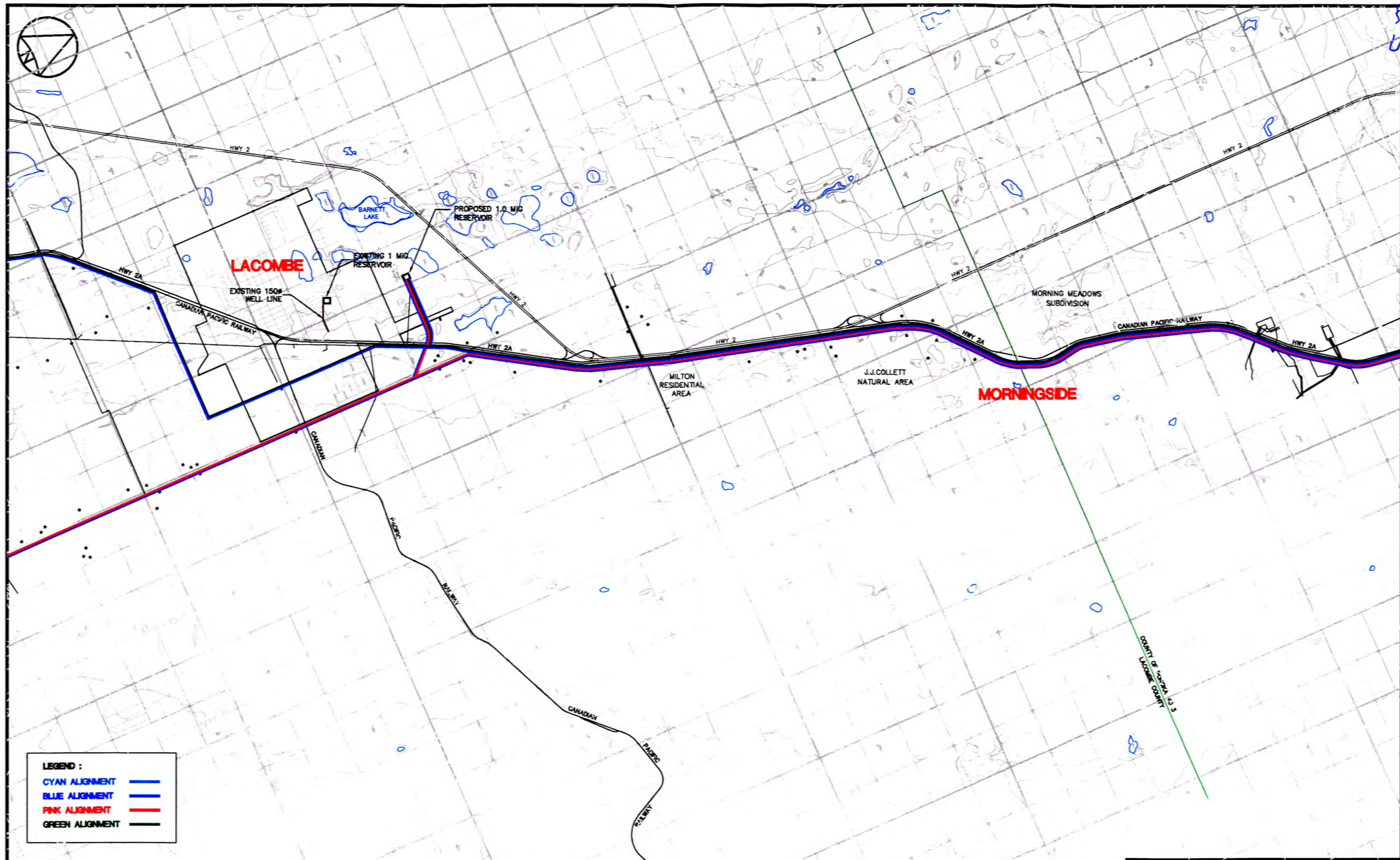
It should also be noted that, for the “pink” alignment, it was thought that the pipeline could be built inside the County’s road right-of-ways. The pipeline would be built inside, but to the side of the road right-of-ways, so as not to interfere with existing roads inside the right-of-ways or possible future widening of these roads. It was thought that land costs could be avoided this way. Lacombe County was approached. They have since advised that the County prefers that the pipeline be installed in a permanent easement; it would only be their “second preference” to allow it to be installed within the road right-of-ways. The County indicated that they typically have not allowed pipeline installations in their road right-of-ways; their concerns are about waterline breaks and washing out of roads.

For purposes of this study, it has been assumed that all the pipelines will be installed in permanent easements, and the related costs have been estimated. It is recommended that, during predesign of the pipeline, the possibility of installing the pipeline in County roads be further discussed with the County.

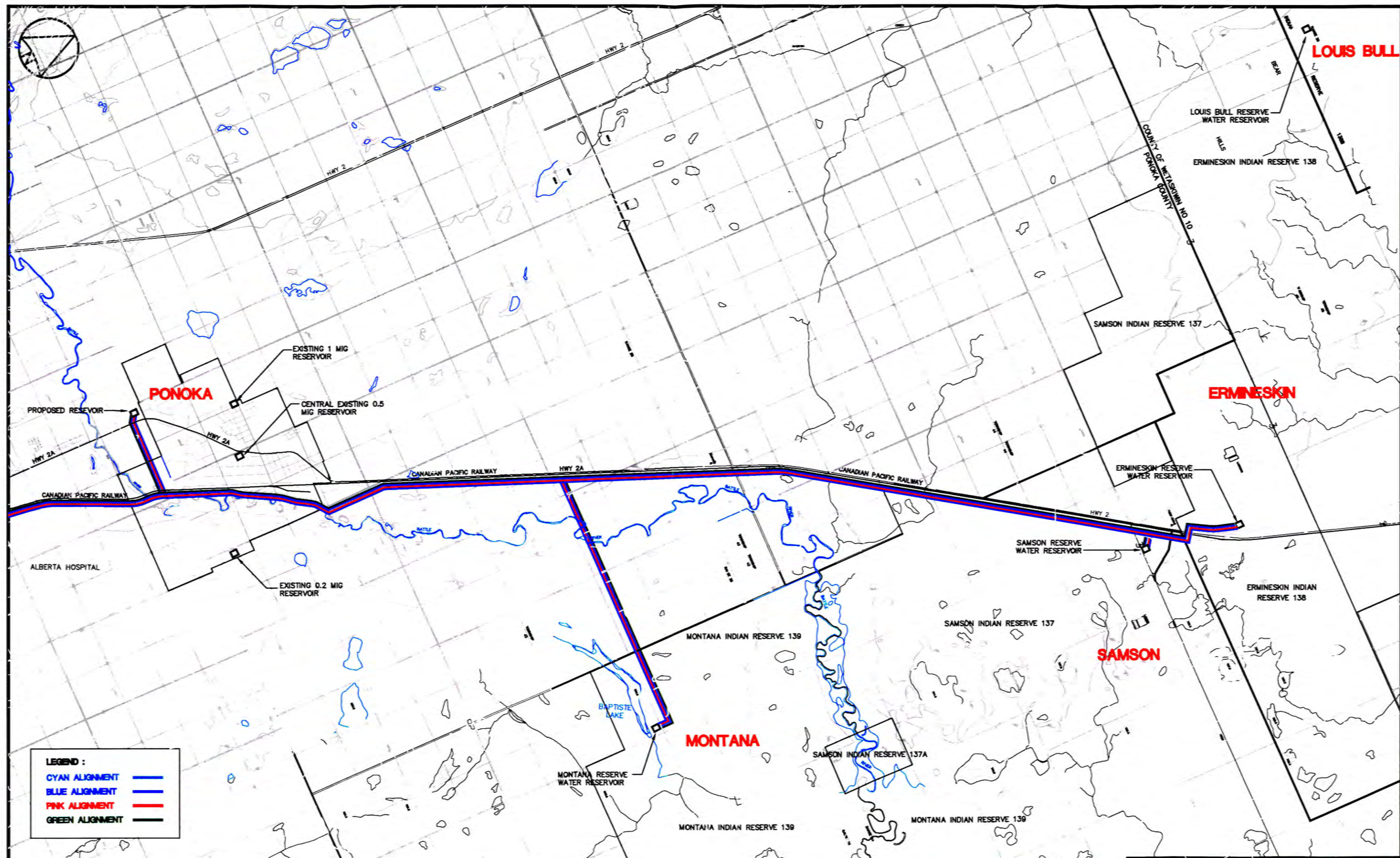
The preferred alignment, costs not considered, appears to be the “green/red” alignment. The main reason being that its intake is upstream of the City of Red Deer’s wastewater treatment plant, and it is a shorter (and thus less expensive) alignment than the “cyan” alignment. The pipeline routing of the green/red

**Blue Alignment
Preferred**





BLACKFALDS, LACOMBE, PONOKA, MONTANA, SAMSON,
 ERMINESKIN, LOUIS BULL FIRST NATIONS REGIONAL WATER STUDY
 SHEET 2 OF 3 **Figure 7.1**



BLACKFALDS, LACOMBE, PONOKA, MONTANA, SAMSON,
ERMINESKIN, LOUIS BULL FIRST NATIONS REGIONAL WATER STUDY
SHEET 3 OF 3 **Figure 7.1**

alignment is better than the blue alignment as it allows more flexibility of options and is closer to the Town of Blackfalds.

8.0 Pipeline Materials and Connection to Users

8.1 PIPELINE MATERIALS

Possible pipeline materials are:

- PVC,
- HDPE, and
- Steel.

Possible
Materials

Calculations have shown that the maximum (50 year) flows that this pipeline will be designed for, PVC pipe is capable of withstanding the pressure, including transient pressures, if the proper pressure rating is selected, and if proper protection is provided against transient pressures and high pressures due to valve closures. The River Section Crossings however, will require special consideration during predesign.

PVC pipe has the advantage over HDPE and steel of being light weight, easy to install, and cost effective.

8.2 HYDRAULIC GRADE LINES AND PIPE PRESSURE RATINGS

For each pipeline alignment, the hydraulic grade lines were calculated. These were calculated for the following cases:

Case 1 – Base Case

This is the case of the Towns of Blackfalds, Lacombe, and Ponoka alone, without the First Nations.

Base Case

Case 2

This covers both the Towns and the First Nations. It considers a 50 year design flow to the Towns and a 20 year design flow to the First Nations.

Case 3

This also covers both the Towns and the First Nations. It considers a 50 year design flow to the Towns and a 50 year design flow to the First Nations.

The following figures show the hydraulic grade lines for the four alignments and the three cases under consideration:

- Figure 8.1.1 – Green Alignment and Green/Red Alignment, Base Case
- Figure 8.1.2 – Green Alignment and Green/Red Alignment, Case 2
- Figure 8.1.3 – Green Alignment and Green/Red Alignment, Case 3
- Figure 8.2.1 – Blue Alignment, Base Case
- Figure 8.2.2 – Blue Alignment, Case 2
- Figure 8.2.3 – Blue Alignment, Case 3
- Figure 8.3.1 – Pink Alignment, Base Case
- Figure 8.3.2 – Pink Alignment, Case 2
- Figure 8.3.3 – Pink Alignment, Case 3
- Figure 8.4.1 – Cyan Alignment, Base Case
- Figure 8.4.2 – Cyan Alignment, Case 2
- Figure 8.4.3 – Cyan Alignment, Case 3

Please note that each figure indicates the selected pipe sizes and pressure ratings.

These have been selected to be always the same for Cases 2 and 3, so that the only difference between Cases 2 and 3 is the need for a booster station, at Ponoka, for Case 3, whereas this is not required in Case 2.

Finally, please also note that:

- All Base Case figures show:
 - the hydraulic grade line for the 50 year water demands; and
 - the hydraulic grade line for the 20 year water demands.

- All Case 2 figures show:
 - the hydraulic grade line for the “50 year Town and 20 year First Nations” water demand; and
 - the hydraulic grade line for the “20 year all over” water demand.

8.3 PROTECTION AGAINST OVERPRESSURIZING OF THE PIPELINES

Protection against transient pressures is further discussed under Section 10.

The control philosophy for the pipeline is discussed in Section 18.

The pipeline also needs to be protected against potential overpressuring. This could occur, for example, when there is no demand at all (no filling of reservoirs) while the pumps at the booster station are on.

Considering, for example, Figure 8.1.3 – Green Alignment, Case 3: Under the 50 year water demands, there is a booster station at Blackfalds, and another one at Ponoka.

If there is no demand anywhere, and if the pumps at Blackfalds are on, then the hydraulic grade of about 960 m would exist in the pipeline. The pressure at Ponoka would be about $960\text{ m} - 800\text{ m} = 160\text{ m}$ or 225 psi. This would overpressure the 450 diameter, PVC, C905 DR25 pipe proposed between Ponoka and Morningside.

Pressure
Reducing Valve
at Morningside

To protect this line, a pressure reducing valve is proposed at Morningside. The pressure at the downstream side of the valve would be set at “elevation at Morningside +7 m (10 psi)”. In addition, a pressure relief valve would be installed at the same location, to protect the line in case of failure of the pressure reducing valve. The setting of the pressure relief valve would be 5 psi higher than the setting of the pressure reducing valve.

8.4 CONNECTIONS TO USERS (RESERVOIRS)

It has been agreed between parties that:

- The estimated cost of the Regional Water System would include one branch-off and connection from the pipeline to one selected reservoir in each Town.

- For Blackfalds, the selected reservoir is the existing one. It is recognized that Blackfalds' long term plans include a proposed reservoir to the north of Town. The filling of this proposed future reservoir is not included in this study.
- For Lacombe, the selected reservoir is the new reservoir, planned for 2001 in the north of the Town. The filling of the existing 1 MIG reservoir on Woodland Drive is not considered in this study. The filling of the existing 0.5 MIG steel reservoir is also not considered in this study.
- For Ponoka, the selected reservoir is the new proposed reservoir at the southwest corner of the Town. The filling of the other, existing reservoirs (Lucas Heights and Central), is not considered in this study.
- For Montana, the selected reservoir is the one near Baptiste Lake.
- For Samson, the selected reservoir is the one on Louis Avenue and Yellowhead Drive.
- For Ermineskin, the selected reservoir is the one in SE 32-44-24-W4, not far from Highway 2A.
- For Louis Bull, it was agreed that, for purposes of this study, the required water flow would be brought to the Ermineskin reservoir only. INAC would then review later how the Louis Bull demand will be brought to the Louis Bull reservoir.

The required sizes for the reservoir connections (branch-offs) have been calculated for both the 20 year and 50 year requirements. Table 8-1 summarizes these requirements.

Required Sizes of
the Reservoir
Connections
(Branch-Offs)

Table 8-1: Reservoir Connections (Branch-Offs) – Required Sizes

	Applies to Alignments	Size for 20 Year Flows	Size for 50 Year Flows	Length of Connection
Blackfalds	Green & Cyan	100 mm	150 mm	25 m
Blackfalds	Blue & Pink	200 mm	250 mm	8,300 m
Lacombe	All	200 mm	300 mm	1,200 m
Ponoka	All	200 mm	250 mm	1,600 m
Montana	All	100 mm	150 mm	5,000 m
Samson	All	150 mm	200 mm	150 m
Ermineskin	All	150 mm	150 mm	10 m

Please note that the above connection sizes have been calculated assuming that the total flow for the particular user (Town or First Nation) is supplied to the one reservoir (selected above) through one single connection.

Future predesign can review these assumptions, e.g. Ponoka and Lacombe might want water delivered to more than one reservoir.

The cost estimates in this report include the costs for the 50 year connections only.

9.0 SCADA System

The Supervisory Control and Data Acquisition system is an important element of the pipeline, pump stations and reservoir fill points.

This system will allow the central operator to monitor and control pipeline flows, individual reservoir fill rates and pipeline pressures.

Control Pipeline
Operator

In addition, monitoring of the fill rate and level of the local reservoir will also be available locally, at each community.

This SCADA system will allow the operator to ascertain that minimum pressures at key locations in the pipeline are maintained, and to check on the water levels in each water reservoir. If necessary, the central operator can override the automatic controls, to favour the filling of certain reservoirs over others. Normally, such overriding will not be required.

The system will consist of, at each local reservoir site:

- a pressure sustaining valve;
- a fill rate control valve;
- a magnetic flowmeter;
- an ultrasonic level transmitter;
- a pressure transmitter;
- a PLC/RTU;
- a site operator interface;
- a radio modem;
- an antenna;
- a lightning arrestor; and
- a UPS system.

In addition, at the upstream end of the pipeline at Morningside, there will also be:

- a pressure transmitter;
- a PLC/RTU;
- a generator interface;
- a radio modem;
- an antenna;
- a lightning arrestor; and
- a UPS system.

The central control room can be located at the proposed water treatment plant, in case of a water treatment plant. In case the pipeline is connected to the City of Red Deer's water system, the central control room can be located at the Public Works office of one of the communities, e.g. Lacombe.

**Central Control
Room**

Local operators of the other communities can telephone the central operator in case of concerns; the central operator is the only one who can override automatic controls on the system.

10.0 Pipeline Transient Pressures

Transient pressures in a pipeline are deviations from the normal steady state pressures. Both positive pressure surges and negative pressures (vacuum) may occur.

Surge pressures are generated by changes in velocity of the water flowing in the pipeline. Causes of pressure surges include:

- opening and closing of pipeline valves;
- starting and stopping of pumps;
- liquid column separation; and
- entrapped air.

Causes

The maximum surge of pressure is related to the maximum velocity in a pipeline, and to the material and thickness of the pipeline wall. For example, in a 500 mm diameter PVC pipeline, with a wall thickness of 28 mm (DR18), where the velocity of the water is 1.5 m/sec., the maximum surge pressure can be 87 psi above the normal water pressure.

**Magnitude of
Surges**

Preliminary calculations for this report have considered transient pressures, and preliminary pipe selections have been made accordingly. Still, it is recommended that, during predesign and design of the pipeline, a detailed analysis of transient pressures be made to include simulations of valve operations, pump start-up and shut-down operations, power failure, etc. Such an analysis will allow:

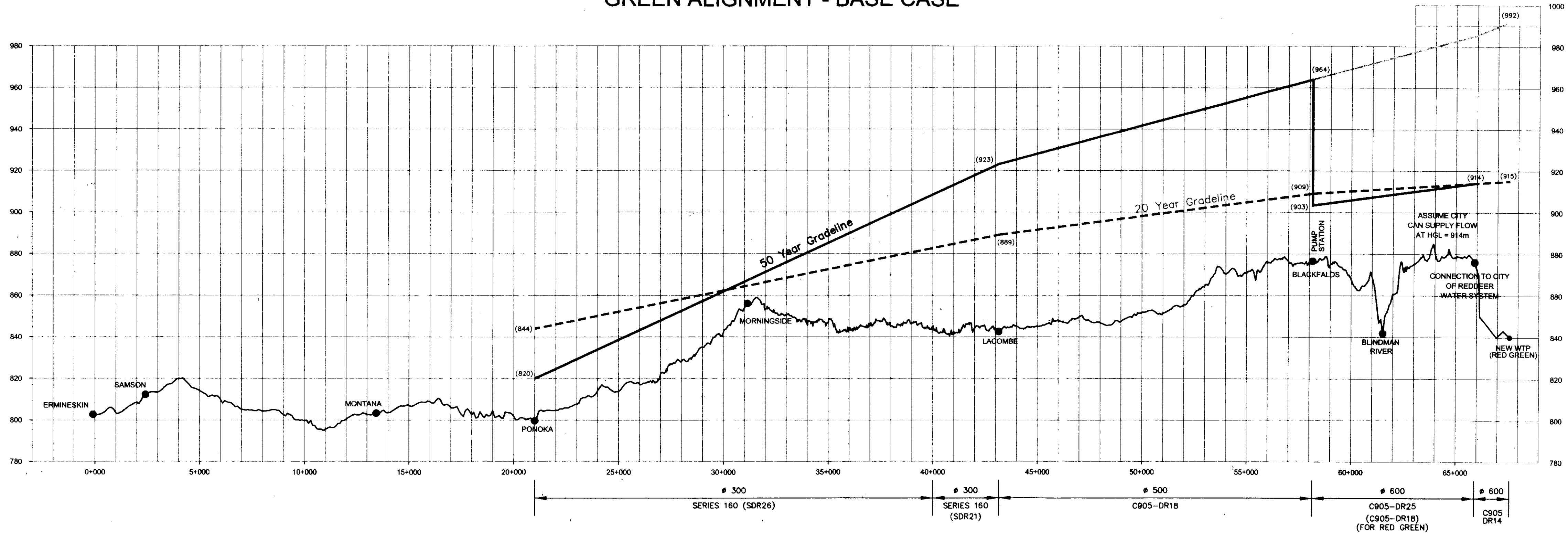
- choosing the type and proper location for protection devices; and
- making the optimum selection of pipe and wall thickness.

Typical surge protection devices include:

- slow closing valves which will control the minimum period of time over which a valve can close;
- time delays, for example to prevent pump start-up during a transient pressure event;
- surge tanks;
- standpipes; and
- pressure relief valves and bypass valves.

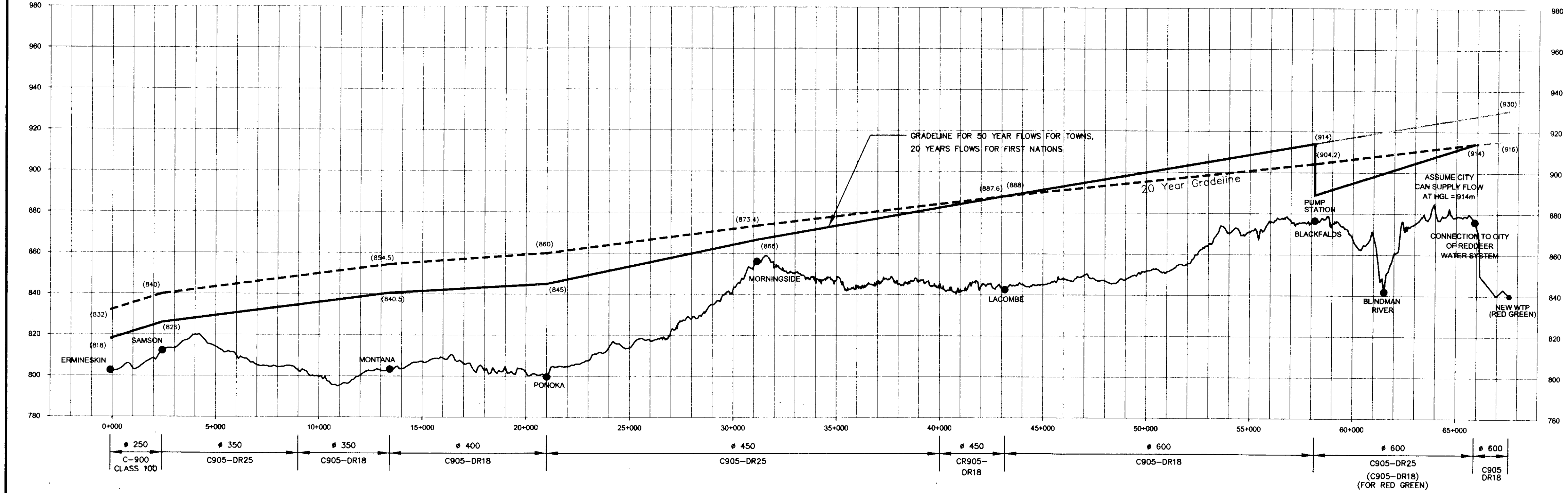
Protection Devices

GREEN ALIGNMENT - BASE CASE



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA
Figure 8.1.1

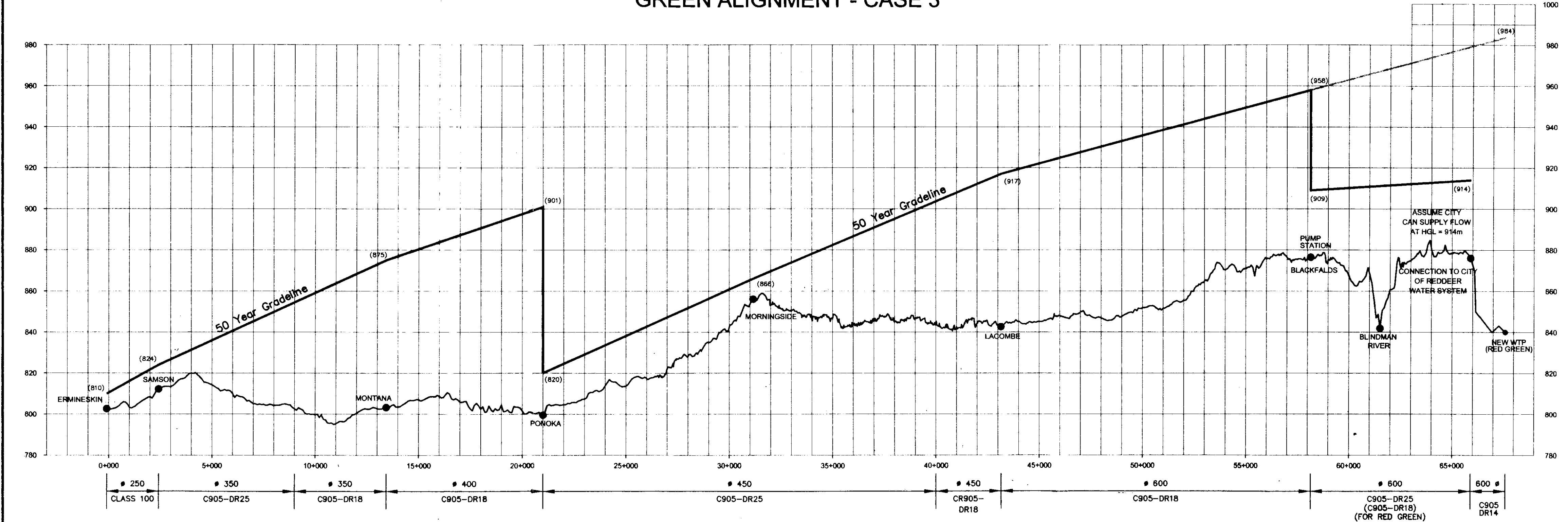
GREEN ALIGNMENT - CASE 2



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.1.2

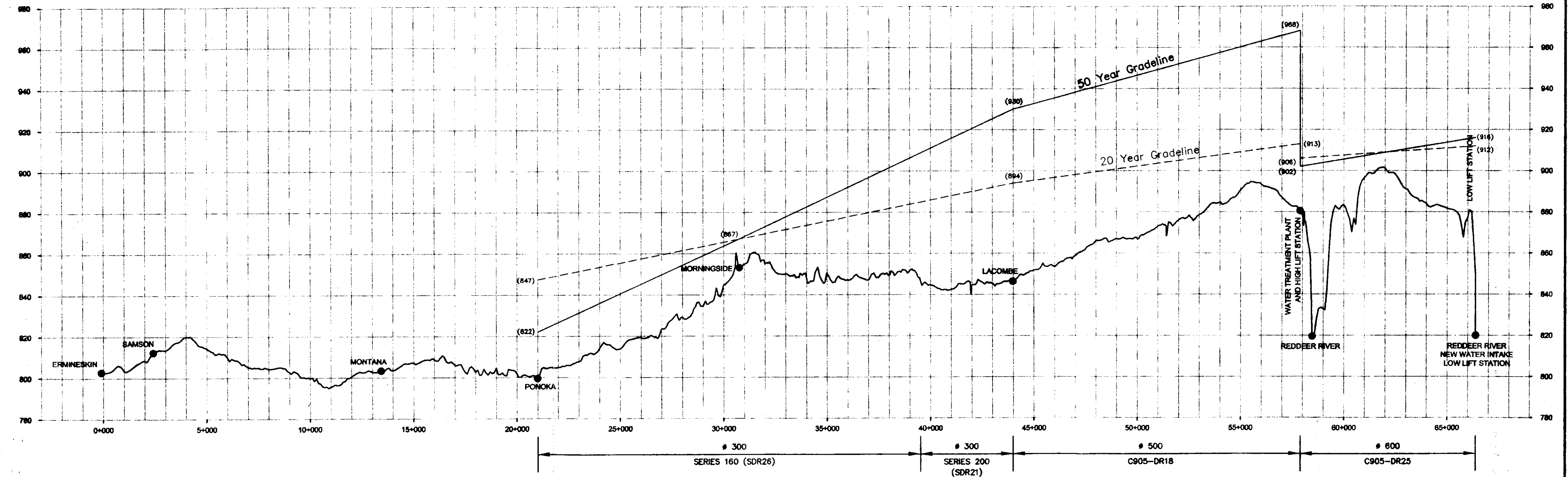


GREEN ALIGNMENT - CASE 3



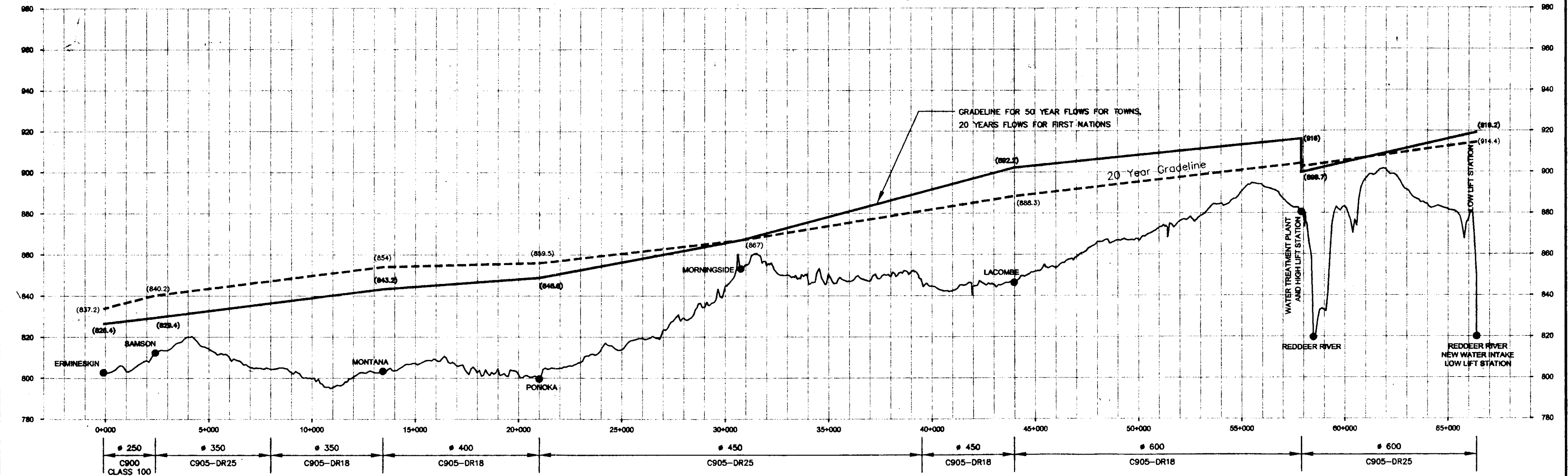
REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.1.3

BLUE ALIGNMENT - BASE CASE



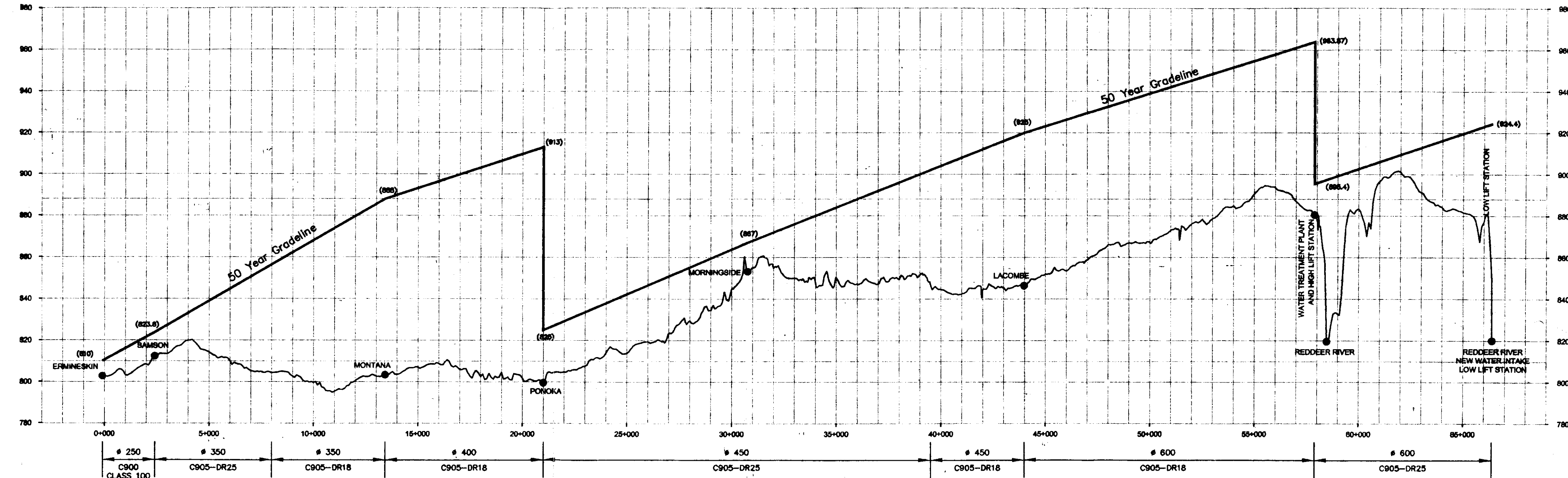
REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA
Figure 8.2.1

BLUE ALIGNMENT - CASE 2



REGIONAL WATER SYSTEM - PROFILE
 BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
 Figure 8.2.2

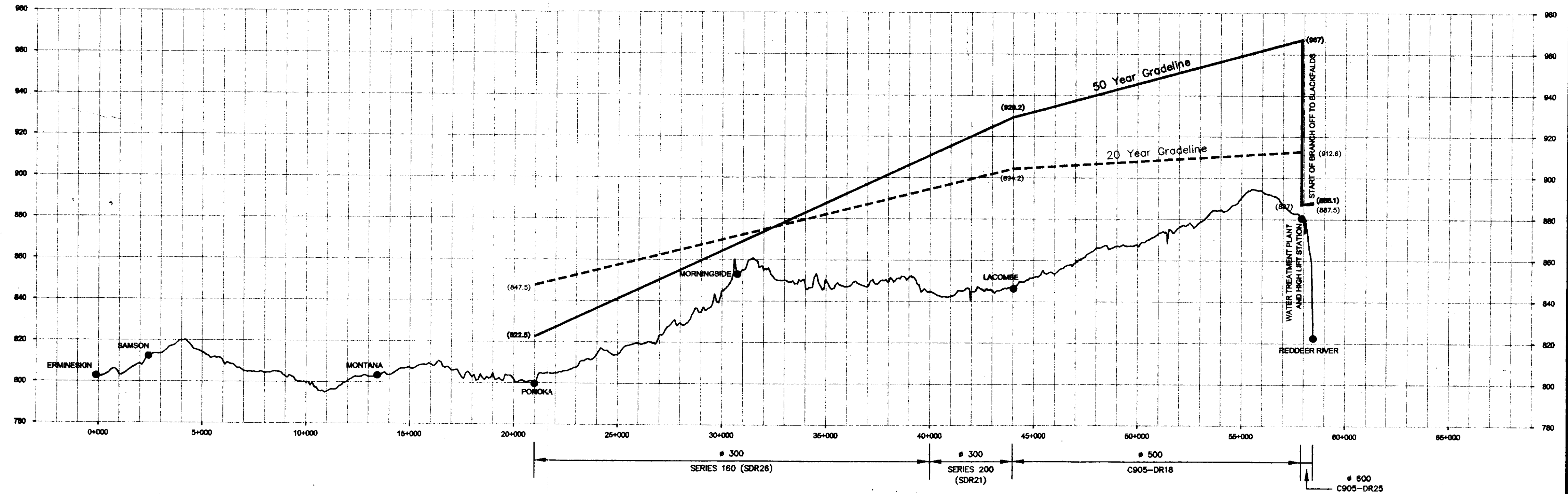
BLUE ALIGNMENT - CASE 3



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.2.3

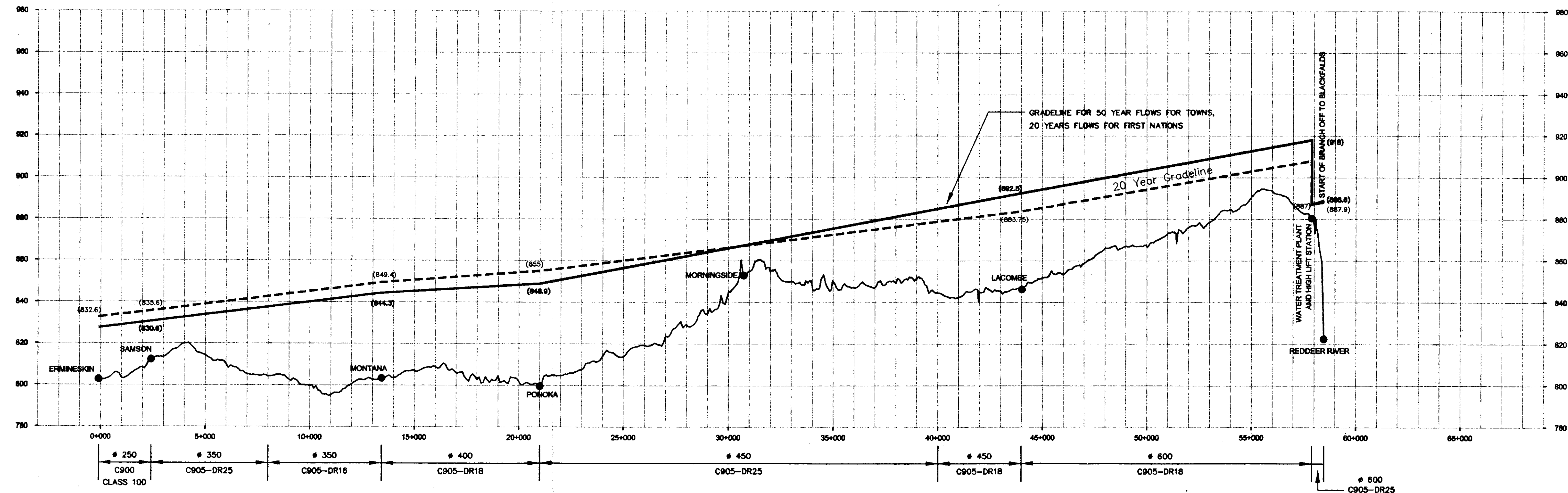


PINK ALIGNMENT - BASE CASE



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA
Figure 8.3.1

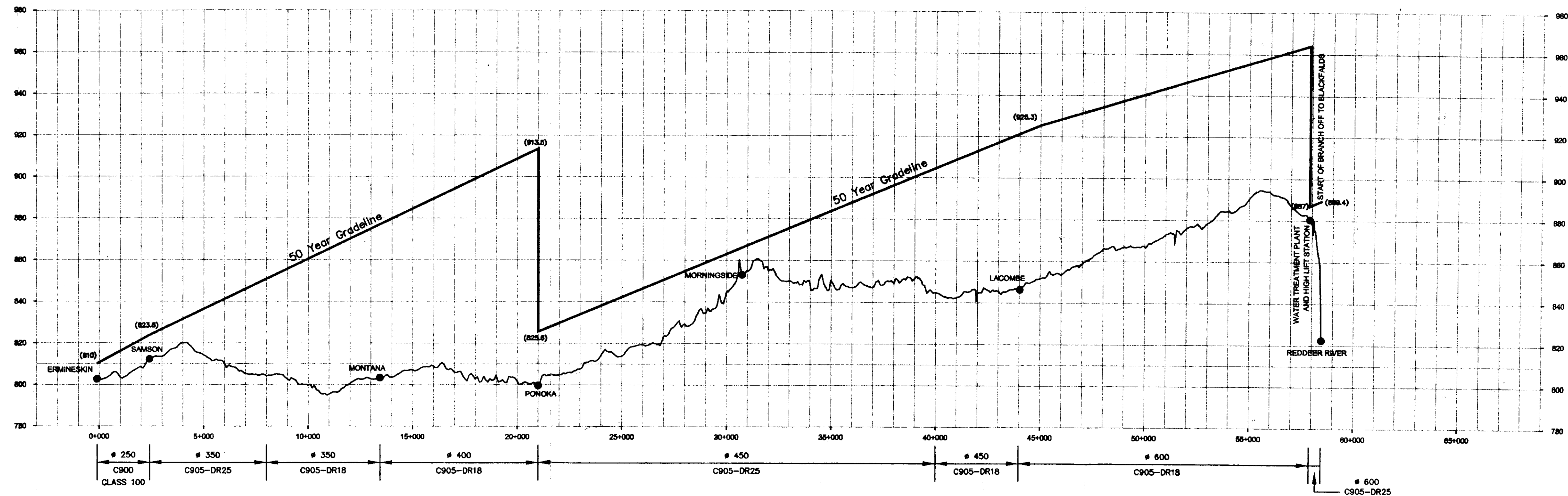
PINK ALIGNMENT - CASE 2



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.3.2



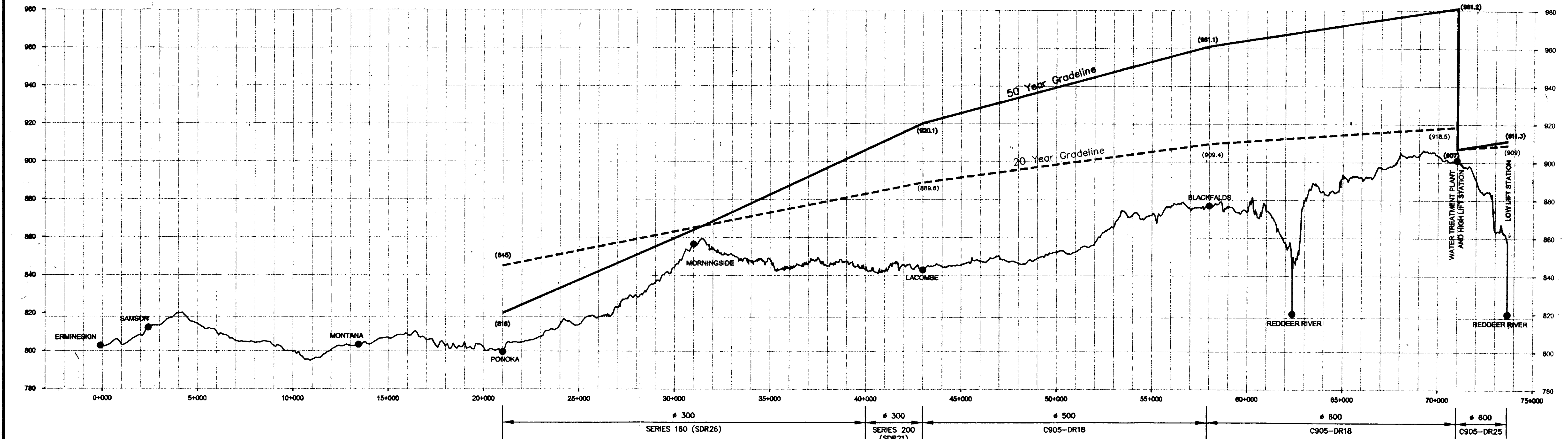
PINK ALIGNMENT - CASE 3



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.3.3

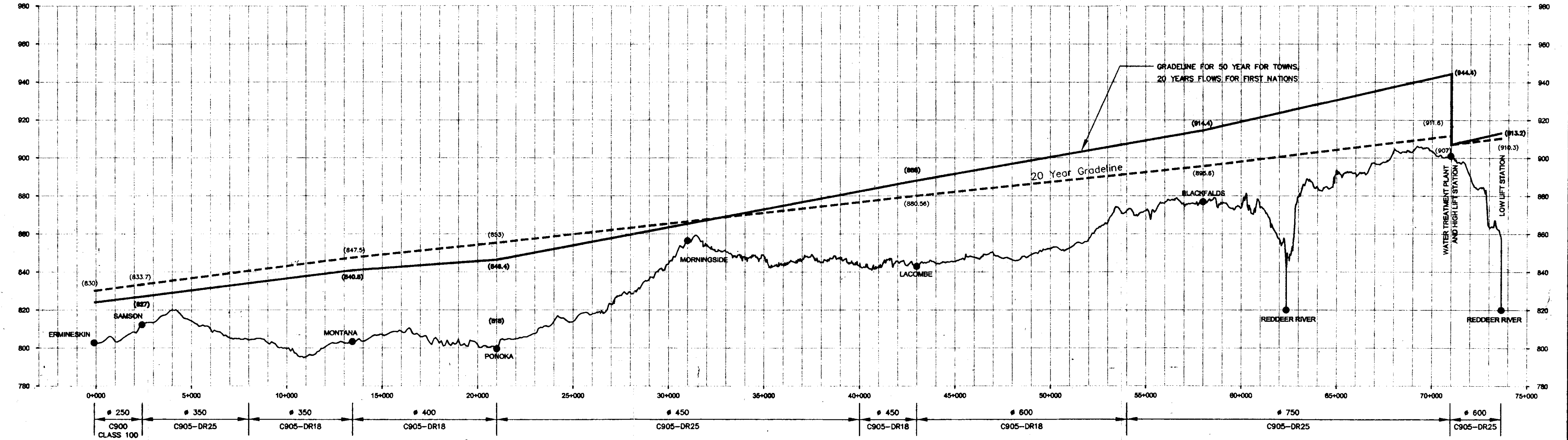


CYAN ALIGNMENT - BASE CASE



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA
Figure 8.4.1

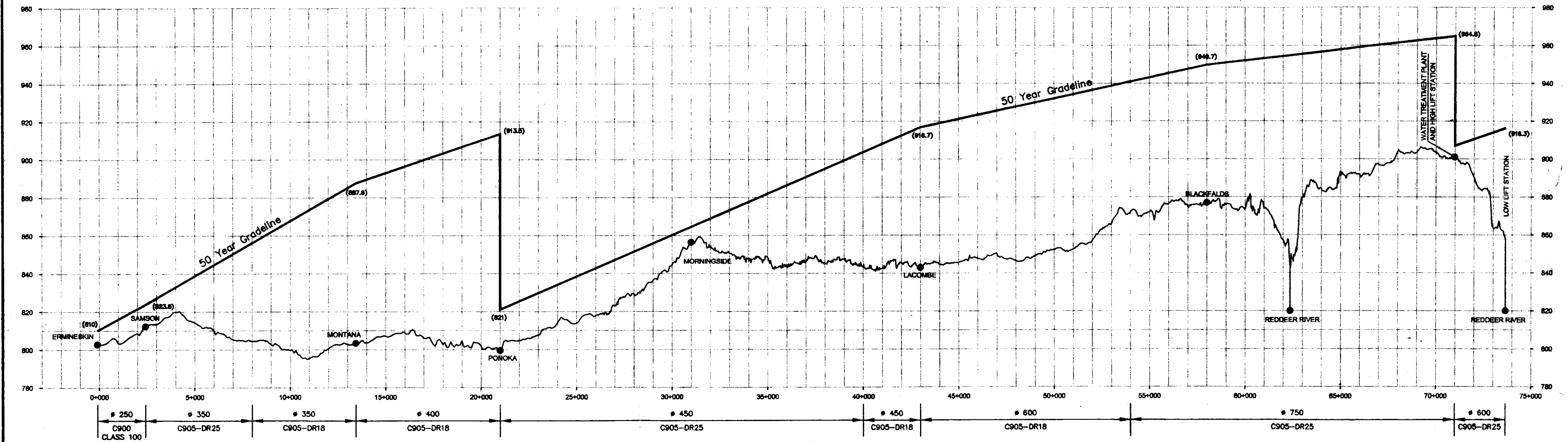
CYAN ALIGNMENT - CASE 2



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.4.2



CYAN ALIGNMENT - CASE 3



REGIONAL WATER SYSTEM - PROFILE
BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
Figure 8.4.3



11.0 Water Treatment Plant

11.1 CAPACITY CRITERIA

The new water treatment plant will be designed to provide a capacity to meet the 20 year pipeline design flows as shown in Table 4-4 above.

The plant will be sized to produce water at a rate equal to the 20 year pipeline design flow plus plant losses (due to backwashing, filter rinse to waste, water required for flushing, and other in-plant water requirements) over a 22 hour period.

This in-plant water requirement will be assumed to be 10% of the maximum day demand. The following, Table 11-1, depicts projected plant capacity requirements.

Table 11-1: Plant Capacity Requirements

	20 Year Pipeline Daily Demand (m ³)	Plant Daily Losses (m ³)	Maximum Plant Daily Production (m ³)	Plant Capacity Required (L/s)
Blackfalds, Lacombe and Ponoka Only	23,388	2,339	25,727	298
Blackfalds, Lacombe, Ponoka and First Nations	30,154	3,015	33,169	384

11.2 WATER TREATMENT PROCESSES

All water treatment facilities are to be designed to meet or exceed the Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, 1996 Revision.

Conventional water treatment plant processes would typically consist of the following:

- rapid mixing of chemicals;
- flocculation (e.g. hydraulic flocculators);
- sedimentation (e.g. horizontal flow type; up-flow type);
- filtration (e.g. declining rate filtration, constant rate filtration); and

Conventional Plant

- disinfection (e.g. post-chlorination to ensure bacteriologically safe treated water; pre-chlorination might be considered to ensure individual unit processes are not affected by bacterial growths).

Chemicals typically used include:

- aluminum sulphate (liquid alum, dosage as liquid alum, primary coagulant);
- polyelectrolyte (praestol, powder bags of 20 kg, secondary coagulant);
- sodium hydroxide (caustic, for pH adjustment); and
- chlorine (as gas, 68 kg cylinders or ten containers, disinfection).

While this report and the cost estimates allow for hydraulic flocculators, horizontal flow type sedimentation, declining rate filtration using dual media anthracite and sand filters, the Predesign Report should compare alternate types of flocculation, sedimentation and filtration and recommend the most effective solution.

Under the present Alberta Environment Standards and Guidelines, a surface water treatment system shall ensure a minimum reduction in pathogen levels as follows:

Disinfection

- 3 log reduction in Giardia; and
- 4 log reduction in viruses.

These required reductions are achieved by removals/inactivation utilizing conventional filtration plus removals/inactivation due to disinfection. Conventional filtration methods provide a reduction credit as follows:

- Giardia Credit: 2.5 log
- Virus Credit: 2.0 log

The remainder of the log reduction has to be made up by disinfection. For disinfection to be effective in inactivation of Giardia and viruses, chlorine contact time is required. The required contact time is dependent upon the pH of the treated water, the chlorine residual concentration, and the temperature of the treated water. The Guidelines and Standards give the requirements for disinfection in terms of the CT requirement, where the CT requirement = Concentration (mg/L chlorine residual concentration) x Time (minutes chlorine contact time for inactivation at the

given chlorine residual concentration, pH level and temperature). If the pH of the treated water is maintained at 7.5, at a temperature of 0.5°C, the required CT to provide the additional 0.5 log reduction for Giardia is 40. The required CT to provide the additional 2.0 log reduction for viruses is 6. Therefore, if adequate CT is provided for the inactivation of Giardia, inactivation of viruses will be realized.

The predesign should further analyze how the CT of 40 will be achieved. The variables are: the chlorine residual level, the treatment of the flow patterns in the clearwell at the plant, and consideration of the length of the pipeline from the water treatment plant to the first user (possibly at Blackfalds).

11.3 CRYPTOSPORIDIUM

As indicated in Section 6.2.2, the current Alberta Environment Standards do not address Cryptosporidium (although the USEPA requires a minimum 2 log removal).

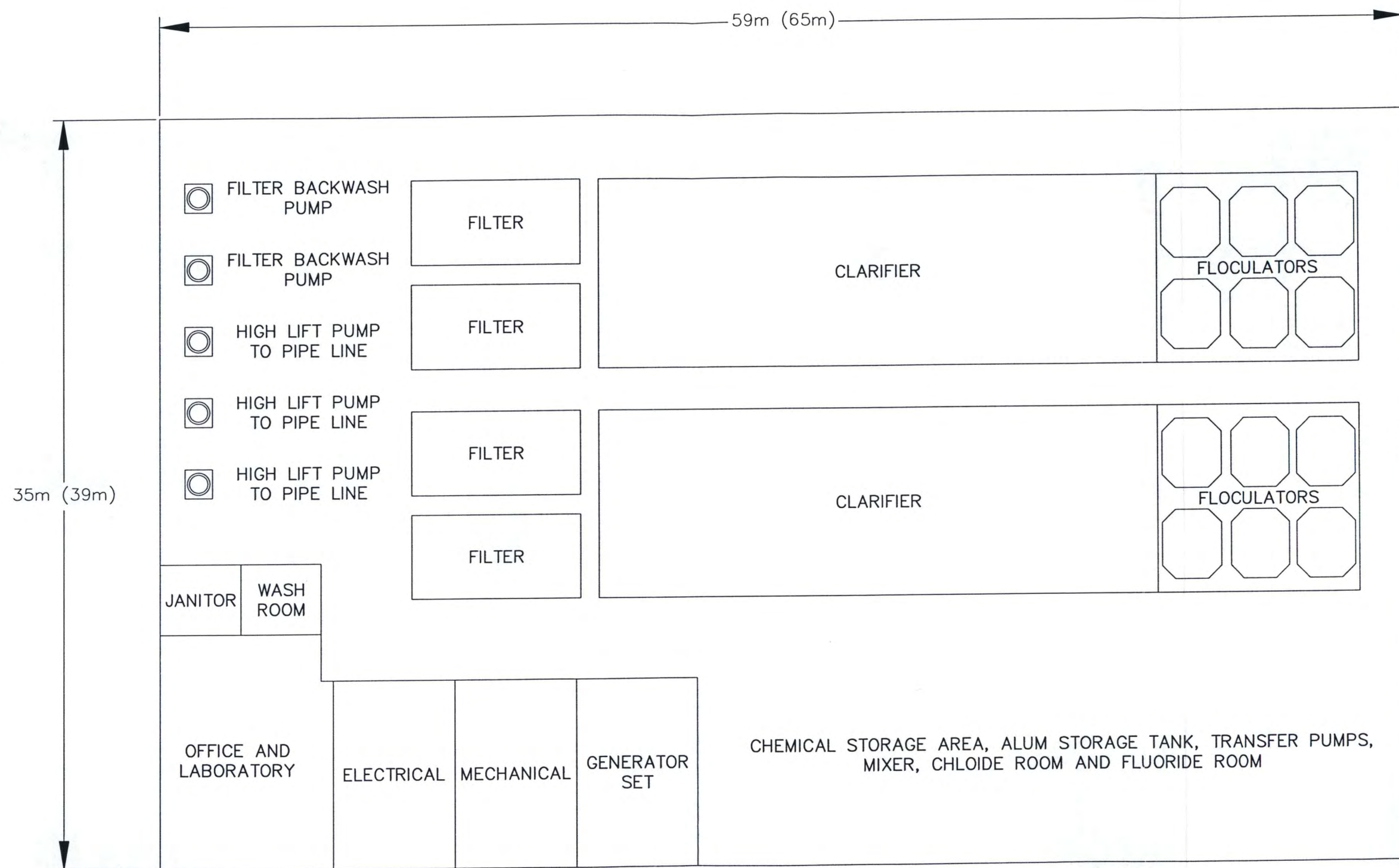
**Cryptosporidium
Not Addressed in
Standards**

A 2 log removal for Cryptosporidium can be achieved by a conventional treatment plant.

However, the City of Red Deer's Water Treatment Master Plan (Associated Engineering, February 2001) indicates high levels of Cryptosporidium in the raw water, which would require 4 log to 6.5 log removal efficiency. This level of removal can not normally be achieved by a conventional treatment plant with chlorine disinfection.

The future predesign of a water treatment plant should thus include sampling and analyzing of the raw water, and, if the high levels of Cryptosporidium are confirmed, consider alternate technologies such as membrane filters, ozonation or the addition of UV radiation of filtered water, to achieve the required removal levels of Cryptosporidium.

The effect on cost of such technologies has not been considered in this report.



REGIONAL WATER SYSTEM - PRELIMINARY CONCEPT
 BLACKFALDS-LACOMBE-PONOKA-MONTANA-SAMSON-ERMINESKIN-LOUIS BULL FIRST NATIONS
 Figure 11.1

11.4 FLUORIDATION

Fluoridation has not been considered at this stage. The need for fluoridation should be considered in the predesign report.

11.5 STORAGE OF RAW RIVER WATER

Storage of raw river water, for example for a period of 7 to 21 days, during periods of high turbidity in the river, is used in some locations on the Red Deer River, to reduce the turbidity of the raw water prior to it entering the plant. At the intake sites considered in this study, it is expected that the concentration and duration of high turbidity is much reduced in comparison with locations as for example Drumheller. Consequently, raw water storage for turbidity reasons is not considered at this time.

Storage for
Sedimentation
Load

Storage of raw river water might have to be considered to cover periods of time where the release of the Dickson Dam might be too low to accommodate all water users, as was verbally suggested by an Alberta Environment representative. However, in view of the fact that the 20 year withdrawal for this regional system, including the First Nations, is only 0.2 m³/s, when compared with the mean minimum flow of 12.8 m³/s of the Red Deer River at Red Deer (between 1985 and 1995 inclusive), we have not allowed for storage of raw water at this time. However, we have allowed for land for the possible future addition of such storage.

Storage to Bridge
Low Supply
Periods

12.0 Land Issues

Land is required for:

- the river intake and low lift station (if any);
- the water treatment plant and the high lift pump station; and
- pipeline permanent and working easements.

12.1 RIVER INTAKE, LOW LIFT STATION, WATER TREATMENT PLANT AND HIGH LIFT STATION

We have allowed for an area of 1.6 ha (4 acres) for the water treatment plant and low lift station, including for future expansions (50 year horizon) of these facilities.

We have also allowed for an area of 46 ha (115 acres) for the possible future installation of raw water storage (14 days) and sludge lagoons, even though these possible future components are not included in the proposed water treatment facilities.

12.2 PIPELINE

For the length of the pipeline, it has been assumed that the following easements will be required:

- permanent easement: 10 m wide, plus
- working easement, 15 m wide, for a total width of 25 m.

13.0 Regulatory Issues

13.1 RED DEER RIVER INTAKE

A Regional Water System with a new treatment plant will require a new intake and the associated licences and approvals for an intake in the Red Deer River.

The process and time requirements for new intake applications have greatly increased in recent years and, in particular, due to the existing water commitments on the Red Deer River, this will be an important and timely component in the implementation of a Regional Water System.

Approvals and licences are required through the following government agencies:

**Approvals and
Licences Required**

- Provincial:
 - Alberta Environment – Water Resources
 - Alberta Environment - Fisheries
- Federal
 - Department of Fisheries and Oceans
 - Department of Navigable Waters
 - National Coast Guard

There is also a requirement from Alberta Environment to determine the “In Stream Flow Needs” of the Red Deer River at the intake location and an associated hydrological assessment of the low flow conditions.

This analysis looks at the minimum water requirements of all river users, including:

- fisheries;
- municipalities/industry;
- recreation users; and
- others.

Based on these minimum water requirements, a restriction on water withdrawal may occur during river low flow periods. Separate studies on the river hydraulics and fishery issues may be required for the approval process. It is suggested that a considerable time (1 to 2 years) be allowed for the study, advertising and approval process associated with a new intake.

13.2 WATER TREATMENT PLANT

A new water treatment plant will require the approval of Alberta Environment, Standards and Approvals Division. The Alberta Environment “Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems” will apply to the water treatment plant.

It is suggested that ongoing meetings with Alberta Environment occur throughout the preliminary and design phases of the water treatment plant which will facilitate the final approval of the facility. In addition, any areas of the treatment plant that deviate from the standards or any new technologies will require close consultation and review by Alberta Environment before implementation.

13.3 PIPELINE AND LAND RECLAMATION ISSUES

All pipelines in Alberta are classified into minor and major, based on their length and size. Major pipelines do require specific testing and reporting in respect to reclamation.

A major pipeline is determined by the following formula:

$$\text{Length of Pipeline (km)} \times \text{Diameter of Pipe (mm)} > 2,690$$

Formula for
Determining a
Major Pipeline

The Red Deer Regional Water Pipeline will be classified as a major pipeline and specific testing, reporting and approvals will be required in respect to topsoil handling, restoration and inspections by Alberta Environment and Alberta Agriculture.

This will involve soils testing along the pipeline route by an Agrologist, determination of topsoil and subsoil zones, recommendations of topsoil separation and replacement during construction and methods to minimize impacts during construction of the pipeline.

13.4 OTHER ISSUES/INTER-BASIN TRANSFER

The Red Deer Regional Water System will entail water withdrawal from the Red Deer River, however, wastewater discharge from the communities of Lacombe, Ponoka and the Hobbema First Nations will be to the Battle River System.

This will require separate approvals and possibly advertising and public hearings to approve this component. Sufficient time should be allowed for approval of this concept.

14.0 Capital Cost Estimates

The capital cost estimates have been developed for the assumptions and design horizons indicated above.

For the pipeline, they include a 10% spare capacity of the non-industrial consumption in Blackfalds, Lacombe and Ponoka.

The cost estimates include (when applicable):

- river intake;
- low lift station;
- water treatment plant;
- land for low lift station and for water treatment plant, and for possible future raw water storage ponds (14 days) and sludge lagoons;
- access road to low lift station;
- pipeline, PVC, mostly C905, 3 m bury;
- removal and replacement, in a controlled fashion, of topsoil, along the pipeline right-of-way;
- permanent and working easements;
- utility and pipeline crossing;
- river crossings (assumed HDPE, directional drilled);
- railway crossings;
- paved road crossings;
- all-weather road crossings;
- valves on the pipeline, at least every 8 km;
- pig launcher and retriever stations at each change of diameter;
- testing, cleaning and commissioning of the pipeline;
- one connection to one reservoir in each community, sized for the 50 year flow; and

- a SCADA system for this pipeline, including a pressure sustaining valve, a full control valve and a magnetic flowmeter on each fill line, as well as a pressure transmitter, or level transmitter in each reservoir, and a site PLC/RTU, radio modem, antenna, lightning arrestor and UPS. Pressure control equipment is also included at Morningside.

The cost estimate does not allow for:

**Not Included in
Cost Estimate**

- raw water storage ponds at the water treatment plant;
- access road to water treatment plant. The plant is assumed to be located near an existing road;
- increased costs (if any) due to the possible application of non-conventional technologies such as membrane filters, ozonation or the addition of UV radiation of filtered water, to achieve higher than log 2 removals of Cryptosporidium; and
- booster stations along the pipeline. The only pumping stations allowed for are the low lift station near the river (in case of a river intake) and the high lift station at the water treatment plant. Calculations have shown that booster stations along the pipeline will only be required after 20 years.

Table 14-1 provides the capital cost estimates for the four pipeline alignments, for the Base Case, i.e. Blackfalds, Lacombe and Ponoka only.

Table 14-2 provides the capital cost estimates for the four pipeline alignments for the case where the Montana, Samson, Ermineskin and Louis Bull are included.

Table 14-1: Regional Water System Capital Cost Estimates
Base Case
Blackfalds, Lacombe and Ponoka Only

	Green Alignment Connects to City of Red Deer	Blue Alignment Intake Upstream of WWTP	Pink Alignment Intake Downstream of WWTP	Cyan Alignment Intake Upstream of WWTP	Green/Red Alignment Connects Upstream of WWTP
	L = 45 km	L = 45.5 km	L = 37.5 km	L = 52.5 km	L = 47.4
1. Water Transmission Main	\$7,270,000	\$7,277,500	\$5,312,500	\$9,692,500	\$7,658,000
2. Topsoil Removal/Replacement	\$486,000	\$491,400	\$405,000	\$567,000	\$512,000
3. Permanent and Working Easements	\$668,000	\$675,390	\$556,640	\$779,300	\$703,600
4. Utility and Pipeline Crossings	\$24,000	\$24,000	\$24,000	\$24,000	\$36,000
5. River, Railway, Highway, Paved Road and All-Weather Road Crossings	\$538,000	\$394,000	\$326,000	\$614,000	\$568,000
6. Valves, Pig Launcher and Retriever Stations	\$709,000	\$287,400	\$287,400	\$540,400	\$709,000
7. Testing, Cleaning and Commissioning	\$35,000	\$35,000	\$35,000	\$40,000	\$35,000
Subtotal Pipeline	\$9,730,000	\$9,184,690	\$6,946,540	\$12,257,200	\$10,221,600
8. River Intake and Low Lift Station	NIL	\$2,145,000	\$2,145,000	\$2,145,000	\$2,145,000
9. Water Treatment Plant	NIL	\$9,626,000	\$9,626,000	\$9,626,000	\$9,626,000
10. Land for LLS and WTP for Possible Future Ponds, etc.	NIL	\$312,500	\$312,500	\$312,500	\$312,500
11. Access Road to LLS	NIL	\$200,000	\$200,000	\$200,000	\$200,000
12. Pipeline SCADA System	\$159,000	\$159,000	\$159,000	\$159,000	\$159,000
13a. Connection to Blackfalds Reservoir	\$1,625	\$986,000	\$986,000	\$1,625	\$1,625
13b. Connection to Lacombe Reservoir	\$197,800	\$275,300	\$275,300	\$197,800	\$197,800
13c. Connection to Ponoka Reservoir	\$215,000	\$215,000	\$215,000	\$215,000	\$215,000
Subtotal	\$10,303,425	\$23,103,490	\$20,865,340	\$25,114,125	\$23,078,525
14. Engineering and Contingencies (25%)	\$2,575,856	\$5,775,873	\$5,216,335	\$6,278,531	\$5,769,631
Subtotal	\$12,879,281	\$28,879,363	\$26,081,675	\$31,392,656	\$28,848,156
15. Net GST (3%)	\$386,378	\$866,381	\$782,450	\$941,780	\$865,445
TOTAL	\$13,265,660	\$29,745,743	\$26,864,125	\$32,334,436	\$29,713,601

Table 14-2: Regional Water System Capital Cost Estimates
Blackfalds, Lacombe, Ponoka,
Montana, Samson, Ermineskin and Louis Bull

	Green Alignment Connects to City of Red Deer	Blue Alignment Intake Upstream of WWTP	Pink Alignment Intake Downstream of WWTP	Cyan Alignment Intake Upstream of WWTP	Green/Red Alignment Intake Upstream of WWTP
	L = 66 km	L = 66.5 km	L = 58.5 km	L = 73.8 km	L = 68.4
1. Water Transmission Main	\$13,597,500	\$13,685,000	\$11,003,500	\$17,468,500	\$14,092,000
2. Topsoil Removal/Replacement	\$712,800	\$718,200	\$631,800	\$797,000	\$738,700
3. Permanent and Working Easements	\$979,688	\$987,100	\$868,400	\$1,095,500	\$1,015,300
4. Utility and Pipeline Crossings	\$35,200	\$35,200	\$32,000	\$39,400	\$47,200
5. River, Railway, Highway, Paved Road and All-Weather Road Crossings	\$727,400	\$837,400	\$759,400	\$845,300	\$757,400
6. Valves, Pig Launcher and Retriever Stations	\$1,062,000	\$872,000	\$872,000	\$1,183,500	\$1,062,000
7. Testing, Cleaning and Commissioning	\$50,000	\$50,000	\$50,000	\$55,000	\$50,000
Subtotal Pipeline	\$17,164,588	\$17,184,900	\$14,217,100	\$21,484,200	\$17,762,600
8. River Intake and Low Lift Station	NIL	\$2,750,000	\$2,750,000	\$2,750,000	\$2,750,000
9. Water Treatment Plant	NIL	\$11,580,000	\$11,580,000	\$11,580,000	\$11,580,000
10. Land for LLS and WTP for Possible Future Ponds, etc.	NIL	\$406,000	\$406,000	\$406,000	\$406,000
11. Access Road to LLS	NIL	\$200,000	\$200,000	\$200,000	\$200,000
12. Pipeline SCADA System	\$254,000	\$254,000	\$254,000	\$254,000	\$254,000
13a. Connection to Blackfalds Reservoir	\$1,625	\$986,000	\$986,000	\$1,625	\$1,625
13b. Connection to Lacombe Reservoir	\$197,800	\$275,300	\$275,300	\$197,800	\$197,800
13c. Connection to Ponoka Reservoir	\$215,000	\$215,000	\$215,000	\$215,000	\$215,000
14. Connections to Montana, Samson, Ermineskin and Louis Bull	\$426,000	\$426,000	\$426,000	\$426,000	\$426,000
Subtotal	\$18,259,013	\$34,277,200	\$31,309,400	\$37,514,625	\$33,793,025
15. Engineering and Contingencies (25%)	\$4,564,753	\$8,569,300	\$7,827,350	\$9,378,656	\$8,448,256
Subtotal	\$22,823,766	\$42,846,500	\$39,136,750	\$46,893,281	\$42,241,281
16. Net GST (3%)	\$684,713	\$1,285,395	\$1,174,103	\$1,406,798	\$1,267,238
TOTAL	\$23,508,479	\$44,131,895	\$40,310,853	\$48,300,080	\$43,508,520

15.0 Operation and Maintenance Costs

Operations and Maintenance (O&M) costs are yearly recurring costs, necessary to operate the Regional System and to maintain it.

This includes:

**O&M Costs
Include**

- maintenance costs;
- salaries and benefits for operators;
- electrical power costs;
- water treatment plant heating costs; and
- water treatment plant chemical costs.

15.1 MAINTENANCE COSTS

Yearly maintenance costs are estimated at 2% of the capital cost of:

- water treatment plant;
- SCADA system; and
- pipeline valves, pig launcher and retriever stations.

15.2 SALARIES AND BENEFITS FOR SYSTEM OPERATORS

15.2.1 In Alternatives with a Water Treatment Plant

It is estimated that there would be three operators covering 24 hours a day, each having an 8 hour shift.

**24 Hour Plant
Operation**

15.2.2 In Alternatives with Connection to the City of Red Deer's Water System

In this case, only the central control system needs regular attention. This monitors the fill valves and pressure controls along the pipeline.

The central control room can be in the Public Works office of one of the Towns. It is estimated that 2 hours a day of an operator's time is sufficient for this operation.

15.3 ELECTRICAL POWER COSTS

Power costs consist essentially of pumping costs. In the case of alternatives with a water treatment plant, this concerns the pumping of the low lift and of the high lift stations.

In the case of the alternative with a connection to the City of Red Deer's water system, there are no electrical power costs as the City of Red Deer supplies the water under pressure.

Booster stations on the pipeline, for all alternatives, become only necessary after year 20; the electrical for these has not been considered.

A cost of 8.5 dollar cents per kwh has been assumed.

15.4 WATER TREATMENT PLANT HEATING AND VENTILATION COSTS

These include the cost of ventilation. The ventilation load is based on six air changes per hour. This was selected in view of the wet atmosphere in the building.

During the design stage, the number of air changes per hour could be reviewed with the aim of lowering it and thus lowering the ventilation cost. Any lowering of the number of air changes requires a check of the resistance building materials in a humid environment.

The energy cost is assumed at \$6.00 per GJ.

15.5 PLANT CHEMICAL COSTS

Plant chemicals include:

- Aluminum Sulphate (Liquid Alum) (Dosages as liquid alum ((50% alum)): 20 mg/L
- Polyelectrolyte (Praestol): 1.0 mg/L
- Sodium Hydroxide (caustic-pH control) (as 48% NaOH): 40 mg/L
- Chlorine (as gas): 8.0 mg/L

Assumed costs are:

Assumed Costs

- Aluminum Sulphate: \$0.16/kg
- Praestol: \$10.00/kg
- Caustic: \$0.48/kg
- Chlorine: \$1.95/kg

Chemical consumption, per 1,000 m³, is estimated at:

- Aluminum Sulphate (200 kg): \$32.00
- Praestol (1 kg): \$10.00
- Caustic (40 kg): \$19.20
- Chlorine (8 kg): \$15.60
- Total cost per 1,000 m³: \$76.80

Table 15-1 summarizes the yearly O&M cost estimates for the five pipeline alignments, for the Base Case, i.e. Blackfalds, Lacombe and Ponoka only.

Table 15-2 summarizes the yearly O&M cost estimates for the five pipeline alignments, for the case where Montana, Samson, Ermineskin and Louis Bull are included.

Table 15-1: Regional Water System Yearly O&M Cost Estimates
Base Case
Blackfalds, Lacombe and Ponoka Only

	Maintenance	Operators	Power	Heating	Chemicals	Total
Year 0						
Green	\$18,575	\$15,000	NIL	NIL	NIL	\$33,575
Blue	\$189,313	\$180,000	\$151,139	\$77,682	\$278,327	\$876,461
Pink	\$189,313	\$180,000	\$118,693	\$77,682	\$278,327	\$844,015
Cyan	\$194,740	\$180,000	\$123,262	\$77,682	\$278,327	\$854,011
Green/Red	\$189,313	\$180,000	\$118,693	\$77,682	\$278,327	\$844,015
Year 10						
Green	\$18,575	\$15,000	NIL	NIL	NIL	\$33,575
Blue	\$189,313	\$180,000	\$177,638	\$77,682	\$327,565	\$952,198
Pink	\$189,313	\$180,000	\$139,499	\$77,682	\$327,565	\$914,059
Cyan	\$194,740	\$180,000	\$144,883	\$77,682	\$327,565	\$924,870
Green/Red	\$189,313	\$180,000	\$139,499	\$77,682	\$327,565	\$914,059
Year 20						
Green	\$18,575	\$15,000	NIL	NIL	NIL	\$33,575
Blue	\$189,313	\$180,000	\$202,844	\$77,682	\$373,435	\$1,023,274
Pink	\$189,313	\$180,000	\$159,306	\$77,682	\$373,435	\$979,736
Cyan	\$194,740	\$180,000	\$165,438	\$77,682	\$373,435	\$991,295
Green/Red	\$189,313	\$180,000	\$159,306	\$77,682	\$373,435	\$979,736

Table 15-2: Regional Water System Yearly O&M Cost Estimates
Blackfalds, Lacombe, Ponoka,
Montana, Samson, Ermineskin and Louis Bull

	Maintenance	Operators	Power	Heating	Chemicals	Total
Year 0						
Green	\$28,162	\$15,000	NIL	NIL	NIL	\$43,162
Blue	\$242,376	\$180,000	\$175,536	\$91,806	\$326,270	\$1,015,988
Pink	\$242,376	\$180,000	\$131,623	\$91,806	\$326,270	\$972,075
Cyan	\$249,043	\$180,000	\$147,018	\$91,806	\$326,270	\$994,137
Green/Red	\$242,376	\$180,000	\$131,623	\$91,806	\$326,270	\$972,075
Year 10						
Green	\$28,162	\$15,000	NIL	NIL	NIL	\$43,162
Blue	\$242,376	\$180,000	\$211,873	\$91,806	\$421,378	\$1,147,433
Pink	\$242,376	\$180,000	\$158,870	\$91,806	\$421,378	\$1,094,430
Cyan	\$249,043	\$180,000	\$177,452	\$91,806	\$421,378	\$1,119,679
Green/Red	\$242,376	\$180,000	\$158,870	\$91,806	\$421,378	\$1,094,430
Year 20						
Green	\$28,162	\$15,000	NIL	NIL	NIL	\$43,162
Blue	\$242,376	\$180,000	\$273,550	\$91,806	\$508,452	\$1,296,184
Pink	\$242,376	\$180,000	\$205,118	\$91,806	\$508,452	\$1,227,752
Cyan	\$249,043	\$180,000	\$229,109	\$91,806	\$508,452	\$1,258,410
Green/Red	\$242,376	\$180,000	\$205,118	\$91,806	\$508,452	\$1,227,752

16.0 Grants

Under the Alberta Municipal Water/Wastewater Partnership, the part of the study for the Regional Water Supply System, relative to the Towns of Blackfalds, Lacombe and Ponoka, was eligible for a grant of 40.92%. This percentage was based on the 2000 populations of 9,128 for Lacombe, 6,149 for Ponoka and 2,001 for Blackfalds. (Letter of November 21, 2000 to Town of Lacombe.)

Updated population figures taken in July 2001 indicated the following populations: Lacombe = 9,232, Ponoka = 6,703, and Blackfalds = 3,300. Based on these populations, the overall grant would be 40.60%. A combined grant of 40.60% was used for the cost calculations.

17.0 Cost Sharing, Yearly Costs to Communities and Cost Per m³ of Water

17.1 BASE CASE: BLACKFALDS, LACOMBE AND PONOKA ONLY

Two methods of sharing the costs have been considered:

- Equal sharing of capital and yearly O&M costs, based on the relative water demand of each community. The 20 year horizon has been used to determine the portions of the total costs.

Equal Sharing

These are:

- Blackfalds: 16.4%
- Lacombe: 60.3%
- Ponoka: 23.3%

- Sharing of the capital costs of the common system components, based on relative water demand of the communities using the common component. Non-sharing of the capital costs of the system components that serve one community only. Sharing of the yearly O&M costs based on the relative water demand of each community. The 20 year horizon has been used to determine the portions of the total costs.

Sharing of
Common
Components
Only

These are where all three communities share:

- Blackfalds: 16.4%
- Lacombe: 60.3%
- Ponoka: 23.3%

Where only Lacombe and Ponoka share:

- Lacombe: 72.2%
- Ponoka: 27.8%

Table 17-1 shows the yearly cost to the Towns and the cost per m³ of water, in the initial year 0 and at year 20, under the “Equal Sharing” method.

The total cost per m^3 of water in year 0 varies from $85\text{¢}/\text{m}^3$ to $99\text{¢}/\text{m}^3$. In year 20, due to higher water usage, these costs range from $42\text{¢}/\text{m}^3$ to $70\text{¢}/\text{m}^3$.

The calculation took into account: a 40.60% grant on the overall capital cost, and, a 20 year debenture on the portion of the capital to be financed, at $6\frac{3}{8}\%$.

A supply cost of $57\text{¢}/\text{m}^3$ for purchase of the City of Red Deer's water has been assumed. This rate is the average of two rates suggested on a very preliminary basis only, by the City of Red Deer. The first rate is $61.5\text{¢}/\text{m}^3$ and assumes no provincial contribution for the required plant upgrades and the dedicated water main in the City, connecting the Glendale Reservoir. The second rate is $53.0\text{¢}/\text{m}^3$ and assumes a grant of 50% for these items. The reality will likely be smaller than a 50% grant which is why we assumed a rate of $57\text{¢}/\text{m}^3$. This supply cost is a guideline only at this time, as the City of Red Deer is further reviewing its costs. The City of Red Deer will also want to review the latest water demands for the Towns (and First Nations) that we are using in this report. This cost per m^3 is also subject to negotiation.

Water distribution costs and operational costs within each community have not been included in these water rates. Typical costs for these areas range from 25¢ to $40\text{¢}/\text{m}^3$.

Table 17-2 shows the yearly cost to the Towns, and the cost per m^3 of water for each Town, under the "Equal Sharing of Common Components Only" method. It can be seen that under this method, Lacombe's water is some 1¢ to 4¢ less per m^3 ; Ponoka's is 12¢ to 17¢ more expensive; and Blackfalds' can be some 10¢ less or more, depending on the alignment.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

**Table 17-1: Regional Water System
Yearly Cost to Towns – Cost per m³
Blackfalds, Lacombe and Ponoka Only
Equal Sharing**

	Green Alignment		Blue Alignment		Pink Alignment		Cyan Alignment		Green Red Alignment	
Total Capital Cost	\$13,265,660		\$29,745,743		\$26,864,125		\$32,334,436		\$29,713,601	
Grant 40.60%	\$5,385,858		\$12,076,772		\$10,906,835		\$13,127,781		\$12,063,722	
Debtenture Net Amount	\$7,879,802		\$17,668,971		\$15,957,290		\$19,206,655		\$17,649,879	
Yearly Debtenture Cost (20 yrs. 6 ³ /8%)	\$708,062		\$1,587,695		\$1,433,887		\$1,725,868		\$1,585,979	
	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20
O&M Costs/Year	\$33,575	\$33,575	\$876,461	\$1,023,274	\$843,815	\$979,736	\$854,011	\$991,295	\$844,015	\$979,736
Total Cost/Year	\$741,637	\$741,637	\$2,464,156	\$2,610,969	\$2,277,702	\$2,413,623	\$2,579,879	\$2,717,163	\$2,429,994	\$2,565,715
Water Consumption/Year: m ³	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019
Total Cost/Year										
- Blackfalds	\$121,628	\$121,628	\$404,122	\$428,199	\$373,543	\$395,834	\$423,100	\$445,615	\$398,519	\$420,777
- Lacombe	\$447,207	\$447,207	\$1,485,886	\$1,574,414	\$1,373,454	\$1,455,415	\$1,555,667	\$1,638,449	\$1,465,287	\$1,547,126
- Ponoka	\$172,801	\$172,801	\$574,148	\$608,356	\$530,705	\$562,374	\$601,112	\$633,099	\$566,189	\$597,812
Regional System Cost/m ³	28.6	13.1	94.9	46.1	87.8	42.6	99.4	47.9	93.6	45.3
Water Purchase Cost/m ³	57.0	57.0	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Total Cost/m ³	85.6	70.1	94.9	46.1	87.8	42.6	99.4	47.9	93.6	45.3

NOTE: In-Town costs for distribution of water have not been included.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

Appendix A -
Rate Review and Analysis
Campbell Ryder Consulting Group Ltd.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

**Table 17-2: Regional Water System
Yearly Cost to Towns – Cost per m³
Sharing of Common Components Only**

	Green Alignment		Blue Alignment		Pink Alignment		Cyan Alignment		Green/Red Alignment	
Total Capital Cost	\$13,265,660		\$29,745,743		\$26,864,125		\$32,334,436		\$29,713,601	
Capital Cost Blackfalds	\$464,199								\$3,161,661	
Capital Cost Lacombe	\$6,056,925								\$15,975,034	
Capital Cost Ponoka	\$6,744,535								\$10,576,905	
Yearly Debt Service Costs after 40.60% Grant:										
- Blackfalds	\$24,782								\$170,443	
- Lacombe	\$323,584								\$861,203	
- Ponoka	\$359,696								\$570,194	
O&M Costs/Year	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20
- Blackfalds	\$5,506	\$5,506							\$138,419	\$160,677
- Lacombe	\$20,246	\$20,246							\$508,941	\$590,781
- Ponoka	\$7,823	\$7,823							\$196,655	\$228,278
Total Cost/Year										
- Blackfalds	\$30,288	\$30,288							\$308,862	\$331,120
- Lacombe	\$343,830	\$343,830							\$1,370,144	\$1,451,984
- Ponoka	\$367,519	\$367,519							\$766,849	\$798,472
Blackfalds Cost/m ³										
- Regional System Cost	6.8¢/m ³	3.5¢/m ³							0.69¢/m ³	0.38¢/m ³
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	63.8¢/m ³	60.5¢/m ³							0.69¢/m ³	0.38¢/m ³
Lacombe Cost/m ³										
- Regional System Cost	27.6¢/m ³	9.6¢/m ³							1.10¢/m ³	0.40¢/m ³
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	84.6¢/m ³	66.6¢/m ³							1.10¢/m ³	0.40¢/m ³
Ponoka Cost/m ³										
- Regional System Cost	40.6¢/m ³	30.1¢/m ³							0.85¢/m ³	0.65¢/m ³
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	97.6¢/m ³	87.1¢/m ³							0.85¢/m ³	0.65¢/m ³

- NOTE: 1. In-Town costs for distribution of water have not been included.
2. Escalation/inflation rates were not included in future operating/maintenance costs or in the water rate from the City of Red Deer.

17.2 CASE WHICH ALSO INCLUDES THE FIRST NATIONS OF MONTANA, SAMSON, ERMINESKIN AND LOUIS BULL

Three methods of sharing the costs have been considered:

- Oversize of pipeline and extra pipeline length payable by INAC. Balance of capital cost equally shared between Towns. Yearly O&M share by relative water demand of all communities. The communities considered are: Blackfalds, Lacombe, Ponoka and First Nations (as a whole).
- Sharing of the capital costs of the common system components only, based on the relative water demand of the communities. Non-sharing of the capital costs of the system components that serve one community only. Sharing of the yearly O&M costs based on the relative water demand of each community. The 20 year horizon has been used to determine the portions of the total costs.

Oversize and
Extra Length for
INAC

Sharing of
Common
Components
Only

These are where all four communities share:

- Blackfalds: 12.5%
- Lacombe: 45.9%
- Ponoka: 17.7%
- First Nations: 23.9%

Components where only Lacombe, Ponoka and First Nations share:

- Lacombe: 52.5%
- Ponoka: 20.2%
- First Nations: 27.3%

Where only Ponoka and First Nations share:

- Ponoka: 42.6%
- First Nations: 57.4%.

Tables 17-3 and 17-4 show the yearly cost to each community and the cost per m³ of water for each community for these two cost sharing methods.

**Table 17-3: Regional Water System
Blackfalds, Lacombe, Ponoka and First Nations
Yearly Cost to Communities; Cost Per m³
Oversizing and Extra Pipeline Length by INAC
Equal Sharing of Balance by Towns**

	Green Alignment		Blue Alignment		Pink Alignment		Cyan Alignment		Green Red Alignment	
Total Capital Cost	\$23,508,479		\$44,131,895		\$40,310,853		\$48,300,080		\$43,508,520	
Capital Cost Base Case	\$13,265,660		\$29,745,743		\$26,864,125		\$32,334,436		\$29,713,601	
INAC's Capital Cost	\$10,242,819		\$14,386,152		\$13,446,728		\$15,965,644		\$13,794,919	
Towns' Grant 40.60%	\$5,385,858		\$12,076,992		\$10,906,835		\$13,127,781		\$12,063,722	
Towns' Debenture Net Amount	\$7,879,802		\$17,668,971		\$15,957,290		\$19,206,655		\$17,649,879	
Yearly Debenture Cost (20 yrs. 6 ³ / ₈ %)	\$708,061		\$1,587,694		\$1,433,886		\$1,725,867		\$1,585,979	
	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20
O&M Towns/Year	\$32,846	\$32,896	\$773,167	\$986,396	\$739,749	\$934,319	\$756,538	\$957,650	\$739,749	\$934,319
O&M INAC/Year	\$10,316	\$10,316	\$232,821	\$309,788	\$232,326	\$293,433	\$237,599	\$300,760	\$232,326	\$293,433
Total Cost/Year										
- Blackfalds	\$121,509	\$121,517	\$387,181	\$422,151	\$356,476	\$388,386	\$407,114	\$440,097	\$381,419	\$413,329
- Lacombe	\$446,767	\$446,797	\$1,423,599	\$1,552,176	\$1,310,702	\$1,428,028	\$1,496,890	\$1,618,161	\$1,402,414	\$1,519,740
- Ponoka	\$329,956	\$172,643	\$739,865	\$599,763	\$668,191	\$551,792	\$804,254	\$625,259	\$739,066	\$587,229
First Nations	\$10,316	\$10,316	\$232,821	\$309,788	\$232,326	\$293,433	\$237,599	\$300,760	\$232,326	\$293,433
Town's Cost per m³ (m³/year)	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019	2,595,413	5,667,019
- Regional System Cost/m ³	28.5	13.1	91.0	45.4	83.7	41.8	95.6	47.4	89.6	44.5
-Supply Cost/m ³	57.0	57.0	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
- Total Cost/m ³	85.5	70.1	91.0	45.4	83.7	41.8	95.6	47.4	89.6	44.5
First Nations' Cost per m³ (m³/year)	583,416	1,643,026	583,416	1,643,026	583,416	1,643,026	583,416	1,643,026	583,416	1,643,026
- Regional System Cost (No Capital Debenture Costs)	1.8	0.6	39.9	18.9	39.8	17.9	40.7	18.3	39.8	17.9
-Supply Cost/m ³	57.0	57.0	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
- Total Cost/m ³	58.8	57.6	39.9	18.9	39.8	17.9	40.7	18.3	39.8	17.9

NOTE: 1. In-Town and On-Reserve costs for distribution of water have not been included.
2. Escalation/inflation rates were not included in the future operating/maintenance costs.

Regional Water Study
The Communities of Blackfalds, Lacombe, and Ponoka
The First Nations of Montana, Samson, Ermineskin, and Louis Bull

**Table 17-4: Regional Water System
Blackfalds, Lacombe, Ponoka and First Nations
Yearly Cost to Communities; Cost Per m³
Sharing of Common Components Only**

	Green Alignment		Blue Alignment		Pink Alignment		Cyan Alignment		Green/Red Alignment	
Total Capital Cost	\$23,508,479		\$44,131,895		\$40,310,853		\$48,300,080		\$43,508,520	
Capital Cost Blackfalds	\$517,187		\$3,300,171						\$3,083,023	
Capital Cost Lacombe	\$5,289,408		\$13,150,170						\$14,618,983	
Capital Cost Ponoka	\$5,054,323		\$9,039,899						\$8,570,043	
Capital Cost INAC	\$12,647,560		\$18,036,530						\$17,236,471	
Yearly Debenture Costs After 40.60% Grants										
- Blackfalds	\$27,881								\$166,204	
- Lacombe	\$285,148								\$788,100	
- Ponoka	\$272,475								\$462,005	
O&M Costs/Year	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20
- Blackfalds	\$5,395	\$5,395							\$121,509	\$153,469
- Lacombe	\$19,812	\$19,812							\$446,183	\$563,538
- Ponoka	\$7,640	\$7,640							\$172,057	\$217,312
- First Nations	\$10,316	\$10,316							\$232,326	\$293,433
Total Cost/Year										
- Blackfalds	\$33,276	\$33,276							\$287,713	\$319,673
- Lacombe	\$304,960	\$304,960							\$1,234,283	\$1,351,638
- Ponoka	\$280,115	\$280,115							\$634,062	\$679,317
- First Nations	\$10,316	\$10,316							\$232,326	\$293,433
Blackfalds Cost/m ³ (/year)	444,658	860,933							444,658	860,933
- Regional System Cost	7.5¢/m ³	3.9¢/m ³							64.7	37.1
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	64.5¢/m ³	60.9¢/m ³							64.7¢/m ³	37.1¢/m ³
Lacombe Cost/m ³	1,245,672	3,585,643							1,245,672	3,585,643
- Regional System Cost	24.5¢/m ³	8.5¢/m ³							99.1	37.7
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	81.5¢/m ³	65.5¢/m ³							99.1	37.7
Ponoka Cost/m ³	905,083	1,220,443							905,083	1,220,443
- Regional System Cost	30.9¢/m ³	23.0¢/m ³							70.1	55.7
- Supply Cost/m ³	57.0¢/m ³	57.0¢/m ³							NIL	NIL
- Total Cost/m ³	87.9¢/m ³	80.0¢/m ³							70.1	55.7

TABLE FOR

Regional Water Study

The Communities of Blackfalds, Lacombe, and Ponoka

The First Nations of Montana, Samson, Ermineskin, and Louis Bull

	Green Alignment		Blue Alignment		Pink Alignment		Cyan Alignment		Green/Red Alignment	
NOTE: In-Town and On-Reserve costs for distribution of water have not been included.										
O&M Costs/Year	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20	Year 0	Year 20
First Nations Cost (m³/year)	583,416 m³	1,643,026 m³							583,416	1,643,026
- Regional System Cost (No Capital Debenture Costs)	2.0¢/m³	0.6¢/m³							39.8¢/m³	17.9¢/m³
- Supply Cost/m³	57.0¢/m³	57.0¢/m³							NIL	NIL
- Total Cost/m³	59.0¢/m³	57.6¢/m³							39.8¢/m³	17.9¢/m³

NOTE: In-Town and On-Reserve costs for distribution of water have not been included.

18.0 Control Philosophy

The control philosophy that is described is a general control philosophy.

18.1 CASE WITH A NEW WATER TREATMENT PLANT AND HIGH LIFT STATION

A minimum pressure of 10 psi should always be maintained at the Morningside point near the Samson connection (please refer to ground profiles and hydraulic grade lines in Section 8.0). A pressure sustaining valve can be installed at this location. In addition, a pressure transmitter at this location will control the pumps at the high lift station, to ensure that this pressure is maintained. Pressure transmitters will also be located at each reservoir location. When a reservoir calls for water (based on a drop in the reservoir level), the reservoir fill valve will only open after a minimum pressure is established in the pipeline. This minimum pressure will be predetermined for each reservoir. The pressure transmitter on each fill line will sense the pressure; if it is below the determined setting, then it will cause the high lift pumps to increase in speed, until the set pressure is reached. Then the fill valve will gradually open to a position corresponding with a predetermined fill rate. A flowmeter will control the fill valve. When the reservoir is full, the fill valve will close, and the pressure transmitter on the reservoir will no longer control the high lift pumps.

In addition to the above, pressure sustaining valves on the fill lines to Ponoka, Montana, Samson, and Ermineskin should be set such that a minimum pressure of 10 psi is always maintained at the high lift point near the Samson connection.

Similarly, the pressure sustaining valve on the fill line to the Lacombe reservoir should be set such that the pressure in the branch to the reservoir does not drop below a level equal to 10 psi above the high point at Morningside.

18.2 CASE OF DIRECT CONNECTION TO THE CITY OF RED DEER'S WATER DISTRIBUTION SYSTEM

It is likely that, possibly for 20 years, no separate pump station is required. Pressure would be maintained by the City of Red Deer. We have assumed that the minimum grade line at the City of Red Deer is at 914 m.

In this case, no special controls are required other than the pressure sustaining valves at each reservoir, as indicated above. When a reservoir calls for water (based on a drop in the reservoir level), the reservoir fill valve will open, to a position corresponding with a predetermined fill rate. A flowmeter will control the fill valve. When the reservoir is full, the fill valve will close.

19.0 System Ownership, Operational and Cost Sharing Options

There are a number of options available to the member municipalities in the ownership and operation of the Red Deer Regional Water System.

The types of regional water systems currently operating in Alberta are varied and there are advantages and disadvantages associated with each system. The size of regional systems vary from small two community systems to large regional water commissions involving numerous communities and complex infrastructure.

The main ownership and operational scenarios that would apply to the Red Deer Regional Water System are discussed in the following section.

19.1 COMMUNITY OWNED AND OPERATED SYSTEM

This system is detailed as follows:

- Each community would own a specific percentage of the system (pipeline, treatment plant, etc.) based on the projected demand requirements.
- Each community would provide the capital funding and finance their share of the capital costs of the system.
- One community would take the lead role in the operation and financial management of the system.
- Costs of operations and administration would be documented and reported yearly and shared by all municipalities based on percentage of system ownership.
- Ownership percentages of the system could be adjusted at later dates based on changes of demand or possible new customers.
- Detailed legal agreements would be required between all members of the system.

19.2 WATER COMMISSION

- A water commission could be formed for the region in accordance with the “Alberta Water Commissions Act”.
- The water commission would own, finance and operate the water system and incorporate all costs into a yearly water rate.
- Each community would have representation on the commission and any changes, upgrades, and rate adjustments would be determined by the commission.
- Water rates could be equal for all members or could vary depending on location and length of pipeline.

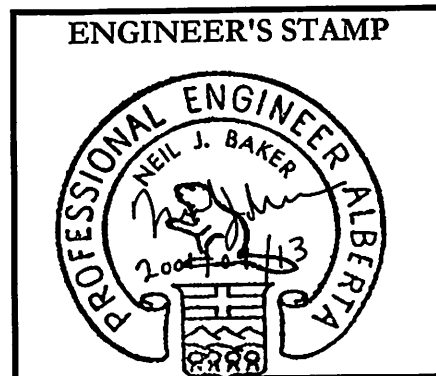
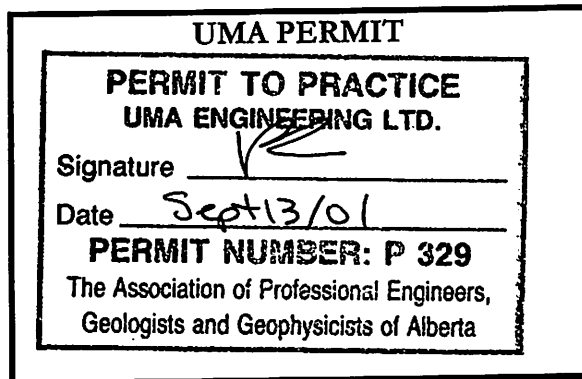
19.3 PRIVATE OWNERSHIP

- Municipalities could contract with a private company or authority to build, finance and operate a regional water system.
- Water rates could vary yearly and would be subject to adjustment by the private owner/operator and subject to review by the Public Utilities Board.
- Precedence has been established where grants available to municipalities could be transferred to a private water operator.

All ownership and operation scenarios should be reviewed in detail by the municipalities and the long term implications considered. Examples of all systems available in Alberta and detailed discussions and review of current systems would be advisable before finalizing the ownership system.

20.0 Report Submittal

This report has been prepared and submitted by UMA Engineering Ltd., as documented below:



UMA ENGINEERING LTD.
THIRD PARTY DISCLAIMER

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**Rate Review & Analysis
of the
North Regional Water System**

Prepared for

**The Communities of Blackfalds, Lacombe and Ponoka
The First Nations of Montana, Samson, Ermineskin and Louis Bull**

by

Campbell Ryder Consulting Group Ltd.

September, 2001

Introduction

This report has been prepared for The Communities of Blackfalds, Lacombe and Ponoka (The Communities) and the First Nations of Montana, Samson, Ermineskin and Louis Bull (The First Nations). The objective of the report is to develop comparative rates for four alternatives of providing water transmission service for the North Regional Water System. The rate models provided attached to this report are intended to be a guide to assist the Communities and the First Nations in addressing policies and directions for the proposed regional water service.

Summary of Results

This report applies a "utility" or "rate base" method to determine utility revenue requirements for four alternative systems developed for water service to the Communities and the First Nations. That method differs from the "cash" method employed by the Communities, since it addresses the gross and net values of utility assets and capitalization, service life of utility plant, and sources of capital funding and capital structure. The most significant difference lies in the identification of capitalization of the net investment in capital assets, and assigning costs for a return on municipally funded investment in the utility. The "utility" method can simplify budget-making, since it applies a specific or consistent method to determine the amount of revenue that a utility system should generate in a given year. It provides a basis for allocating costs to functions and then distributing those functionalized costs to specific customers or classes of customers according to demand or cost-causation. Finally, it is the method currently employed by the Energy and Utilities Board for determining rates for investor-owned utilities and municipal utilities providing service beyond municipal boundaries.

The "utility" method will generally provide a more stable, revenue requirement than does the "cash" method, lower than the cash method in the early years of

operation and a higher revenue requirement in the latter years of a project. If the Communities and the First Nations adopt a policy requiring the proposed regional water service to be a profit center, supporting general revenues rather than breaking even, the utility method would provide a better means of assessing the level of income that should be generated, and deemed to be appropriate, using accepted regulatory practice.

Table 1 has been prepared to illustrate how the average unit costs vary for the first three years of operation under four different operating alternatives identified by UMA engineering. Option 1 is for a water pipeline to the Communities only with treated water supplied by the City of Red Deer. Option 2 adds a water treatment plant to a pipeline serving only the Communities. Option 3 extends the water pipeline only to the First Nations and expands its capacity accordingly. Option 4 expands the Option 2 water treatment plant and pipeline to accommodate the First Nations.

Table 1: Average Wholesale Water Costs

	Year 1 \$/m ³	Year 2 \$/m ³	Year 3 \$/m ³
Option 1 – Base Case	0.788	0.758	0.734
Option 2 – Water Treatment Plant	0.813	0.726	0.657
Option 3 – Base Case + First Nations	0.754	0.732	0.714
Option 4 – Water Treatment Plant + First Nations	0.693	0.627	0.572

The rates calculated by the model are postage stamp commodity rates for water delivered to each Community and/or First Nation. Therefore, Options 1 and 3 include the cost of water purchased from the City of Red Deer.

A postage stamp rate is the same rate for service regardless of location. It derives its name from the post office practice of charging the same rate whether a letter is delivered to the same city or across the country. If the project proceeds,

consideration should be given as to whether rates should be postage stamp or vary by location.

A commodity charge recovers all costs through the unit cost of water, regardless of whether they vary with the amount of commodity sold or whether they are fixed or related to some other quantity. If the alternative of a water treatment plant is chosen, then consideration should be given to a rate design that recovers the fixed cost of operation through fixed monthly fees and the cost of capacity through capacity charges. The ultimate rate design chosen will depend on the alternative chosen and system design. However, the postage stamp commodity rate provides a useful method of comparison of the alternatives.

In summary, the cost of water delivered under all four alternatives is very close, given that estimates were used for all costs, including the mid-range estimate of the cost of water purchased from the City of Red Deer. Since the cost of water purchased from Red Deer is an add-on to the cost of the transmission-only alternatives, a one cent/m³ reduction in the cost of purchased water results in a one cent/m³ reduction in the postage stamp rate. Depending on the ultimate rate Red Deer proposes, the choice of whether to proceed with a water treatment plant may depend on other considerations, such as obtaining approval for the plant or whether the Communities and the First Nations wish to assume the additional responsibilities of operating a treatment plant as well as a transmission system.

Assumptions

The construction costs for the various options are as set out at pages 43 and 44 of the UMA report. Capital assets were classified according to the categories set out at page 14 of the UMA report. These assets were depreciated over the service lives set out at page 14 of the UMA report with two exceptions. The construction costs of the low lift facility and the water treatment plant were divided between equipment and structures. Structures were depreciated over the 50 year life of the project and the equipment was assumed to have a useful service life of twenty

years. The SCADA system was depreciated over a 10 year useful service life. Depreciation is a non-cash expense and forms part of the cost of providing service.

Operating and maintenance expenses for Year 1 are as set out at pages 48-49 of the UMA report. A general inflation factor of 2.5% was applied to all expenses. For options 2 and 4, additional increases in the cost of power, heating and chemicals were assumed in proportion to increases in volume. For Options 1 and 3, the price for water purchased in all years from Red Deer was the mid-range value of \$0.57/m³, found at page 52 of the UMA report.

Capital costs consist of the cost of debt incurred to finance the non-grantable portion of the project. The cost of debt was assumed to be the current AMFC rate of 6.25% for a 20 year debenture. As the system operates, the owners of the system will build up equity in the system as the debt portion of financing is paid down. The rate model utilized a cost of equity of 9.25%. This represents the most recent cost of equity set by the Energy and Utilities for investor-owned utilities within the Board's jurisdiction. The operator of the system will fall under the Board's jurisdiction only on a complaint basis. Therefore, the return on equity can be whatever the operator considers to be suitable and financially prudent. Capital costs appear as "return" on Schedule "C".

Provincial grants to the Communities were assumed to be at the rate of 40.6%, as set out at page 50 of the UMA report. Indian and Northern Affairs (INA) grants to the First Nations for additional capacity and connections were assumed to be 100%. The ultimate rate for service on the system will depend on the ultimate level of grants. Both Provincial and INA grants were amortized over the life of the project. Amortization appears as a credit to non-cash expenses in Schedule "C".

10 Year Forecast

At the preliminary presentation of the rate models, the members of the Regional Water Investigation Steering Committee indicated that it would be helpful if the rate model were projected out for a ten year period of initial operation. This has been summarized in Table 2, attached.

The same assumptions that formed the three year forecast are incorporated in the ten year forecast. The forecast consumption is based on the population and volume forecasts for 1, 4, 9, etc. years supplied by UMA. The forecast consumption for intervening years were interpolated linearly. Power costs are inflated by a factor of 2.5%, even though it is not possible to predict the level of prices when the current price cap is removed. However, it should not make too much difference to the relative rates as Red Deer would likely flow through its power costs if water were purchased from that source.

For the purposes of the forecast, Red Deer's price for the purchased water options has been held steady at \$0.57/m³. It is unlikely that purchased supply would be so stable over the 10 year period. Red Deer could decrease its price as volume increases or it could add on any extraordinary cost increases its operations experience.

Similarly, the costs of chemicals and operations could change if environmental regulations change or water quality in the Red Deer River deteriorates. These changes are also not possible to forecast over the next ten years.

Finally, no allowance has been made for replacements or additions to the system. For example, the SCADA system likely would require changes or upgrading as the software and hardware for these systems become obsolete within the 10 year expected life.



Table 2 – 10 Year Projection of Relative Rates

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³
Option 1 - Base Case	0.788	0.758	0.734	0.728	0.723	0.717	0.713	0.708	0.702	0.696
Option 2 - Water Treatment Plant	0.813	0.726	0.657	0.641	0.626	0.612	0.600	0.589	0.572	0.558
Option 3 - Base Case + First Nations	0.754	0.732	0.714	0.707	0.701	0.696	0.690	0.686	0.681	0.676
Option 4 - Water Treatment Plant + First Nations	0.693	0.627	0.572	0.552	0.534	0.518	0.504	0.492	0.478	0.466

NORTH WATER SYSTEM
Utility Rate Base

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. Gross Plant In Service (Schedule "A-1")										
a) Opening Balance	-	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660
b) Additions	13,265,660	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660	13,265,660
2. Accumulated Depreciation (Schedule "A-2")										
a) Opening Balance	-	125,009	375,027	625,044	875,062	1,125,080	1,375,097	1,625,115	1,875,133	2,125,150
b) Additions	125,009	250,018	250,018	250,018	250,018	250,018	250,018	250,018	250,018	250,018
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	125,009	375,027	625,044	875,062	1,125,080	1,375,097	1,625,115	1,875,133	2,125,150	2,375,168
3. Net Plant In Service										
a) Opening Balance (Line 1. a) - Line 2. a))	-	13,140,651	12,890,633	12,640,615	12,390,598	12,140,580	11,890,562	11,640,545	11,390,527	11,140,509
b) Closing Balance (Line 1. d) - Line 2. d))	13,140,651	12,890,633	12,640,615	12,390,598	12,140,580	11,890,562	11,640,545	11,390,527	11,140,509	10,890,492
c) Total	13,140,651	26,031,284	25,531,249	25,031,213	24,531,178	24,031,142	23,531,107	23,031,072	22,531,036	22,031,001
d) Mid Year Balance	6,570,325	13,015,642	12,765,624	12,515,607	12,265,589	12,015,571	11,765,554	11,515,536	11,265,518	11,015,500
4. Necessary Working Capital										
a) Cash Expenses incl. Water Purchases (Schedule "D")	16,788	34,414	35,275	36,157	37,061	37,987	38,937	39,910	40,908	41,931
b) One-Eighth of Cash Expenses	2,098	4,302	4,409	4,520	4,633	4,748	4,867	4,989	5,113	5,241
c) Prepaid Expenses	-	-	-	-	-	-	-	-	-	-
d) O&M Inventory	-	-	-	-	-	-	-	-	-	-
e) Necessary Working Capital (b+c+d)	2,098	4,302	4,409	4,520	4,633	4,748	4,867	4,989	5,113	5,241
5. Utility Rate Base @ Mid Year	<u>6,572,424</u>	<u>13,019,944</u>	<u>12,770,034</u>	<u>12,520,126</u>	<u>12,270,221</u>	<u>12,020,320</u>	<u>11,770,421</u>	<u>11,520,525</u>	<u>11,270,632</u>	<u>11,020,742</u>

NORTH WATER SYSTEM
Continuity Schedule of Fixed Assets

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Land & Land Rights</u>	<u>River Intake/ Low Lift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2001	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2002	0	0	0	0	0	0	0	0	0
Additions	1,583,625					10,943,750	533,572	204,713	13,265,660
Retirements									0
2003	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2004	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2005	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2006	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2007	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2008	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2009	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2010	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2011	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0
2012	1,583,625	0	0	0	0	10,943,750	533,572	204,713	13,265,660
Additions									0
Retirements									0

NORTH WATER SYSTEM
Continuity Schedule of Accumulated Depreciation

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>River Intake/ LowLift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2001	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2002	0	0	0	0	0	0	0	0
Additions	0	0	0	0	109,438	5,336	10,236	125,009
Retirements								0
2003	0	0	0	0	109,438	5,336	10,236	125,009
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2004	0	0	0	0	328,313	16,007	30,707	375,027
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2005	0	0	0	0	547,188	26,679	51,178	625,044
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2006	0	0	0	0	766,063	37,350	71,649	875,062
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2007	0	0	0	0	984,938	48,021	92,121	1,125,080
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2008	0	0	0	0	1,203,813	58,693	112,592	1,375,097
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2009	0	0	0	0	1,422,688	69,364	133,063	1,625,115
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2010	0	0	0	0	1,641,563	80,036	153,534	1,875,133
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2011	0	0	0	0	1,860,438	90,707	174,006	2,125,150
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
2012	0	0	0	0	2,079,313	101,379	194,477	2,375,168
Additions	0	0	0	0	218,875	10,671	20,471	250,018
Retirements								0
Useful Service Life	50	20	50	20	50	50	10	
Depreciation Rate	2.00%	5.00%	2.00%	5.00%	2.00%	2.00%	10.00%	

NORTH WATER SYSTEM
Continuity Schedule of No-Cost Capital

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions				0
Retirements				0
2001	0	0	0	0
Additions				0
Retirements				0
2002	0	0	0	0
Additions	5,385,858			5,385,858
Retirements				0
2003	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2004	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2005	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2006	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2007	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2008	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2009	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2010	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2011	5,385,858	0	0	5,385,858
Additions				0
Retirements				0
2012	5,385,858	0	0	5,385,858
Additions				0
Retirements				0

NORTH WATER SYSTEM
Continuity Schedule of Amortization of No-Cost Capital

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions	0	0	0	0
Retirements				0
2001	0	0	0	0
Additions	0	0	0	0
Retirements				0
2002	0	0	0	0
Additions	53,859	0	0	53,859
Retirements				0
2003	53,859	0	0	53,859
Additions	107,717	0	0	107,717
Retirements				0
2004	161,576	0	0	161,576
Additions	107,717	0	0	107,717
Retirements				0
2005	269,293	0	0	269,293
Additions	107,717	0	0	107,717
Retirements				0
2006	377,010	0	0	377,010
Additions	107,717	0	0	107,717
Retirements				0
2007	484,727	0	0	484,727
Additions	107,717	0	0	107,717
Retirements				0
2008	592,444	0	0	592,444
Additions	107,717	0	0	107,717
Retirements				0
2009	700,162	0	0	700,162
Additions	107,717	0	0	107,717
Retirements				0
2010	807,879	0	0	807,879
Additions	107,717	0	0	107,717
Retirements				0
2011	915,596	0	0	915,596
Additions	107,717	0	0	107,717
Retirements				0
2012	1,023,313	0	0	1,023,313
Additions	107,717	0	0	107,717
Retirements				0
Useful Service Life	50	50	50	
Amortization Rate	2.00%	2.00%	2.00%	

NORTH WATER SYSTEM
Capitalization, Cost of Capital and Return
Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	Year 1	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		3,835,642	58.36%	98.19%	3,835,642	6.25%	239,728
2. Equity		70,782	1.08%	1.81%	70,782	9.25%	6,547
3. Sub Total		3,906,424	59.44%	100.00%	3,906,424	6.30%	246,275
4. No-Cost Capital (Schedule "B-2")		2,666,000	40.56%		2,666,000	0.00%	-
5. Total		6,572,424	100.00%		6,572,424	3.75%	246,275
	Year 2	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,560,510	58.07%	97.66%	7,560,510	6.25%	472,532
2. Equity		181,294	1.39%	2.34%	181,294	9.25%	16,770
3. Sub Total		7,741,803	59.46%	100.00%	7,741,803	6.32%	489,302
4. No-Cost Capital (Schedule "B-2")		5,278,141	40.54%		5,278,141	0.00%	-
5. Total		13,019,944	100.00%		13,019,944	3.76%	489,302
	Year 3	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,332,036	57.42%	96.48%	7,332,036	6.25%	458,252
2. Equity		267,574	2.10%	3.52%	267,574	9.25%	24,751
3. Sub Total		7,599,610	59.51%	100.00%	7,599,610	6.36%	483,003
4. No-Cost Capital (Schedule "B-2")		5,170,424	40.49%		5,170,424	0.00%	-
5. Total		12,770,034	100.00%		12,770,034	3.78%	483,003
	Year 4	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,089,284	56.62%	95.06%	7,089,284	6.25%	443,080
2. Equity		368,136	2.94%	4.94%	368,136	9.25%	34,053
3. Sub Total		7,457,420	59.56%	100.00%	7,457,420	6.40%	477,133
4. No-Cost Capital (Schedule "B-2")		5,062,706	40.44%		5,062,706	0.00%	-
5. Total		12,520,126	100.00%		12,520,126	3.81%	477,133
	Year 5	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,831,359	55.67%	93.39%	6,831,359	6.25%	426,960
2. Equity		483,874	3.94%	6.61%	483,874	9.25%	44,758
3. Sub Total		7,315,232	59.62%	100.00%	7,315,232	6.45%	471,718
4. No-Cost Capital (Schedule "B-2")		4,954,989	40.38%		4,954,989	0.00%	-
5. Total		12,270,221	100.00%		12,270,221	3.84%	471,718
	Year 6	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,557,314	54.55%	91.42%	6,557,314	6.25%	409,832
2. Equity		615,734	5.12%	8.58%	615,734	9.25%	56,955
3. Sub Total		7,173,048	59.67%	100.00%	7,173,048	6.51%	466,787
4. No-Cost Capital (Schedule "B-2")		4,847,272	40.33%		4,847,272	0.00%	-
5. Total		12,020,320	100.00%		12,020,320	3.88%	466,787
	Year 7	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,266,141	53.24%	89.12%	6,266,141	6.25%	391,634
2. Equity		764,725	6.50%	10.88%	764,725	9.25%	70,737
3. Sub Total		7,030,866	59.73%	100.00%	7,030,866	6.58%	462,371
4. No-Cost Capital (Schedule "B-2")		4,739,555	40.27%		4,739,555	0.00%	-
5. Total		11,770,421	100.00%		11,770,421	3.93%	462,371
	Year 8	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,956,769	51.71%	86.47%	5,956,769	6.25%	372,298
2. Equity		931,917	8.09%	13.53%	931,917	9.25%	86,202
3. Sub Total		6,888,687	59.79%	100.00%	6,888,687	6.66%	458,500
4. No-Cost Capital (Schedule "B-2")		4,631,838	40.21%		4,631,838	0.00%	-
5. Total		11,520,525	100.00%		11,520,525	3.98%	458,500
	Year 9	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,628,062	49.94%	83.42%	5,628,062	6.25%	351,754
2. Equity		1,118,449	9.92%	16.58%	1,118,449	9.25%	103,456
3. Sub Total		6,746,511	59.86%	100.00%	6,746,511	6.75%	455,210
4. No-Cost Capital (Schedule "B-2")		4,524,121	40.14%		4,524,121	0.00%	-
5. Total		11,270,632	100.00%		11,270,632	4.04%	455,210
	Year 10	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,278,811	47.90%	79.93%	5,278,811	6.25%	329,926
2. Equity		1,325,527	12.03%	20.07%	1,325,527	9.25%	122,611
3. Sub Total		6,604,338	59.93%	100.00%	6,604,338	6.85%	452,537
4. No-Cost Capital (Schedule "B-2")		4,416,403	40.07%		4,416,403	0.00%	-
5. Total		11,020,742	100.00%		11,020,742	4.11%	452,537

Schedule "B"

**NORTH WATER SYSTEM
Composite Cost of Debt**

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

Debenture Number	Allocation to Water	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	100.00%	6.25%	-	7,671,284	7,449,735	7,214,338	6,964,229	6,698,488	6,416,139	6,116,142	5,797,396	5,458,729	5,098,894
Total Debenture Debt @ Year-End			-	7,671,284	7,449,735	7,214,338	6,964,229	6,698,488	6,416,139	6,116,142	5,797,396	5,458,729	5,098,894
Average Cost of Debt				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

Debenture Number	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3	Year 3
AMFC	6.25%		3,835,642	7,560,510	7,332,036	7,089,284	6,831,359	6,557,314	6,266,141	5,956,769	5,628,062	5,278,811	
Total Debenture Debt @ Mid-Year			3,835,642	7,560,510	7,332,036	7,089,284	6,831,359	6,557,314	6,266,141	5,956,769	5,628,062	5,278,811	
Cost of Debt @ Mid-Year				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

NORTH WATER SYSTEM
Calculation of No-Cost Capital @ Mid-Year

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. No-Cost Capital (Contributions & Grants, Schedule "A-3")										
a) Opening Balance	-	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858
b) Additions	5,385,858	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858	5,385,858
2. Accumulated Amortization (Schedule "A-4")										
a) Opening Balance	-	53,859	161,576	269,293	377,010	484,727	592,444	700,162	807,879	915,596
b) Additions	53,859	107,717	107,717	107,717	107,717	107,717	107,717	107,717	107,717	107,717
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	53,859	161,576	269,293	377,010	484,727	592,444	700,162	807,879	915,596	1,023,313
3. Net No-Cost Capital										
a) Opening Balance (Line 1. a) - Line 2. a))	-	5,331,999	5,224,282	5,116,565	5,008,848	4,901,131	4,793,413	4,685,696	4,577,979	4,470,262
b) Closing Balance (Line 1. d) - Line 2. d))	5,331,999	5,224,282	5,116,565	5,008,848	4,901,131	4,793,413	4,685,696	4,577,979	4,470,262	4,362,545
c) Total	5,331,999	10,556,281	10,340,847	10,125,413	9,909,978	9,694,544	9,479,110	9,263,675	9,048,241	8,832,807
4. Net No-Cost Capital @ Mid-Year	<u>2,666,000</u>	<u>5,278,141</u>	<u>5,170,424</u>	<u>5,062,706</u>	<u>4,954,989</u>	<u>4,847,272</u>	<u>4,739,555</u>	<u>4,631,838</u>	<u>4,524,121</u>	<u>4,416,403</u>

NORTH WATER SYSTEM
Utility Revenue Requirement, Revenue by Source

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	<u>Year 1</u> <u>(Notes 1, 2)</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. Water Purchases (Note 3)	875,223	2,020,212	2,289,977	2,360,887	2,431,796	2,502,705	2,573,614	2,644,523	2,765,954	2,887,384
2. Net Cash Operating Expenses (Schedule "D")	16,788	34,414	35,275	36,157	37,061	37,987	38,937	39,910	40,908	41,931
3. Non-Cash Expenses										
a) Depreciation (Schedule "A-2)	125,009	250,018	250,018	250,018	250,018	250,018	250,018	250,018	250,018	250,018
b) Amortization of NCC (Schedule "A-4)	<u>(53,859)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>	<u>(107,717)</u>
c) Total	71,150	142,301	142,301	142,301	142,301	142,301	142,301	142,301	142,301	142,301
4. Return (Schedule "B")	<u>246,275</u>	<u>489,302</u>	<u>483,003</u>	<u>477,133</u>	<u>471,718</u>	<u>466,787</u>	<u>462,371</u>	<u>458,500</u>	<u>455,210</u>	<u>452,537</u>
5. Gross Revenue Requirement	<u>1,209,436</u>	<u>2,686,229</u>	<u>2,950,556</u>	<u>3,016,477</u>	<u>3,082,875</u>	<u>3,149,780</u>	<u>3,217,222</u>	<u>3,285,234</u>	<u>3,404,372</u>	<u>3,524,152</u>
6. Total Water Consumption (m ³ /year)	1,535,480	3,544,232	4,017,504	4,141,906	4,266,308	4,390,710	4,515,112	4,639,514	4,852,550	5,065,586
7. Average Wholesale Cost of Water (\$/m ³)	<u>0.788</u>	<u>0.758</u>	<u>0.734</u>	<u>0.728</u>	<u>0.723</u>	<u>0.717</u>	<u>0.713</u>	<u>0.708</u>	<u>0.702</u>	<u>0.696</u>

Notes:

1. Year 1 is assumed to be 2002
2. Assuming Operation mid-year, July 1 of year 1
2. Assume rate of \$0.57/m³ from City of Red Deer

**NORTH WATER SYSTEM
Cash Operating Expenses**

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

Account Code	Year 1 (Note 1)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Maintenance	18,575	19,039	19,515	20,003	20,503	21,016	21,541	22,080	22,632	23,198
Operators	15,000	15,375	15,759	16,153	16,557	16,971	17,395	17,830	18,276	18,733
Power	-	-	-	-	-	-	-	-	-	-
Heating	-	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-	-
Totals	16,788	34,414	35,275	36,157	37,061	37,987	38,937	39,910	40,908	41,931

Note 1: Total is half year's expenses

NORTH WATER SYSTEM

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

	Present - 2001			Estimated 2002 Consumption M³ / Year	Estimated 2003 Consumption M³ / Year	Future - 2004			Estimated 2005 Consumption M3 / Year	Estimated 2006 Consumption M3 / Year	Estimated 2007 Consumption M3 / Year	Estimated 2008 Consumption M3 / Year	5 Year Future - 2009			Estimated 2010 Consumption M3 / Year	Estimated 2011 Consumption M3 / Year	Estimated 2012 Consumption M3 / Year	Estimated 2013 Consumption M3 / Year	10 Year Future - 2014			20 Year Future - 2024			50 Year Future - 2054				
	Population	Consumption				Population	Consumption						Population	Consumption						Population	Consumption		Population	Consumption		Population	Consumption		Population	Consumption
		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year
Blackfalds	3,300	14.1	445,665	490,682	535,698	4,300	18.4	580,715	595,018	609,322	623,625	637,929	4,830	20.7	652,232	668,297	684,362	700,427	716,492	5,424	23.2	732,557	6,843	29.3	924,102	13,736	58.8	1,855,049		
Lacombe																														
Urban	9,232	39.5	1,246,782	1,381,832	1,516,882	12,232	52.4	1,651,932					14,180	60.7	1,915,041						15,502	66.4	2,093,532	17,991	77.0	2,429,629	28,121	120.4	3,797,705	
Industrial			-				15.0	473,040						20.0	630,720							40.0	1,261,440		40.0	1,261,440		40.0	1,261,440	
Total Lacombe	9,232	39.5	1,246,782	1,539,512	1,832,242	12,232	67.4	2,124,972	2,209,130	2,293,288	2,377,446	2,461,604	14,180	80.7	2,545,761	2,707,604	2,869,446	3,031,288	3,193,130	15,502	106.4	3,354,972	17,991	117.0	3,691,069	28,121	160.4	5,059,145		
Ponoka	6,703	28.7	905,240	919,023	932,807	7,009	30.0	946,590	961,221	975,853	990,484	1,005,115	7,551	32.3	1,019,746	1,035,508	1,051,270	1,067,032	1,082,794	8,134	34.8	1,098,556	9,440	40.4	1,274,920	14,756	63.2	1,992,802		
Other Industrial/ Residential Uses *				121,743	243,485		11.6	365,228	376,537	387,846	399,155	410,465		13.4	421,774	441,141	460,508	479,875	499,242		16.4	518,609		18.7	589,009		28.2	890,700		
Total - Towns Only				3,070,959	3,544,232			4,017,504	4,141,906	4,266,308	4,390,710	4,515,112			4,639,514	4,852,550	5,065,586	5,278,622	5,491,658											
Hobbema																														
Montana - Urban	102	0.4	13,775	14,201	14,627	111	0.5	15,052	15,532	16,011	16,491	16,970	129	0.6	17,450	18,006	18,562	19,117	19,673	150	0.6	20,229	201	0.9	27,186	489	2.1	65,988		
Montana - Rural	462	0.5	15,177	15,646	16,115	505	0.5	16,584	20,957	25,331	29,704	34,077	585	1.2	38,451	39,676	40,900	42,125	43,350	678	1.4	44,575	912	1.9	59,905	2,213	4.6	145,405		
Samson - Urban	1,453	6.2	196,228	202,293	208,358	1,588	6.8	214,423	221,254	228,084	234,914	241,745	1,841	7.9	248,575	256,494	264,412	272,330	280,249	2,134	9.1	288,167	2,868	12.3	387,272	6,960	29.8	940,011		
Samson - Rural	3,392	3.5	111,427	114,871	118,315	3,707	3.9	121,760	153,869	185,978	218,087	250,196	4,297	9.0	282,305	291,298	300,291	309,284	318,276	4,981	10.4	327,269	6,694	13.9	439,822	16,249	33.9	1,067,564		
Ermineskin - Urban	500	2.1	67,525	69,612	71,699	546	2.3	73,786	76,137	78,487	80,838	83,188	633	2.7	85,539	88,263	90,988	93,713	96,438	734	3.1	99,163	987	4.2	133,266	2,395	10.3	323,473		
Ermineskin - Rural	1,782	1.9	58,539	60,348	62,157	1,947	2.0	63,967	80,835	97,704	114,573	131,441	2,257	4.7	148,310	153,035	157,759	162,483	167,208	2,617	5.5	171,932	3,517	7.3	231,062	8,537	17.8	560,849		
Louis Bull - Urban	673	2.9	90,889	93,698	96,507	735	3.1	99,316	102,480	105,644	108,808	111,971	853	3.7	115,135	118,803	122,470	126,138	129,805	988	4.2	133,473	1,328	5.7	179,377	3,224	13.8	435,394		
Louis Bull - Rural	528	0.6	17,345	17,881	18,417	577	0.6	18,953	23,951	28,949	33,948	38,946	669	1.4	43,944	45,344	46,743	48,143	49,543	775	1.6	50,943	1,042	2.2	68,463	2,529	5.3	166,177		
Total Hobbema	8,892	18.1	570,904	588,550	606,196	9,717	19.8	623,842	695,015	766,189	837,362	908,535	11,264	31.1	979,709	1,010,917	1,042,126	1,073,334	1,104,543	13,058	36.0	1,135,751	17,549	48.4	1,526,354	42,596	117.5	3,704,863		
Total	28,127	100.5	3,168,591	3,659,509	4,150,428	33,258	147.2	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	37,825	178.2	5,619,223	5,863,467	6,107,712	6,351,956	6,596,201	42,119	216.9	6,840,445	51,823	253.9	8,005,454	99,209	428.2	13,502,558		

Assumptions

- Urban Consumption based on 370 litres per person per day
- Rural Consumption based on 180 litres per person per day
- * at 10% of urban consumption of Blackfalds, Lacombe and Ponoka

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

Assumptions

Blackfalds - Add a further 1,000 in 3 years and then 2.35% annual increase thereafter

Lacombe - Add further 3,000 in 3 years due to Meridian/Industrial Growth, 3% annual increase until 2010 and 1.5% annual increase thereafter

Ponoka - 1.5% annual increase

Hobbema - 3.0% annual increase

November

December (est)	16,614	68,346	518	43,288	144,435	3,899		277,100
Yearly Totals	16,614	68,346	518	43,288	144,435	3,899	0	277,100

NORTH WATER SYSTEM
Population
Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

2026	2027	2028	2029	2030	2031	2032	2033	30 2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	40 2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	50 2054
7,168	7,337	7,509	7,685	7,866	8,051	8,240	8,434	8,632	8,835	9,042	9,255	9,472	9,695	9,923	10,156	10,395	10,639	10,889	11,145	11,407	11,675	11,949	12,230	12,517	12,811	13,112	13,421	13,736
18,534	18,812	19,095	19,381	19,672	19,967	20,266	20,570	20,879	21,192	21,510	21,833	22,160	22,492	22,830	23,172	23,520	23,873	24,231	24,594	24,963	25,338	25,718	26,103	26,495	26,892	27,296	27,705	28,121
9,726	9,872	10,020	10,170	10,322	10,477	10,634	10,794	10,956	11,120	11,287	11,456	11,628	11,803	11,980	12,159	12,342	12,527	12,715	12,906	13,099	13,296	13,495	13,697	13,903	14,111	14,323	14,538	14,756
214	220	227	233	240	248	255	263	271	279	287	296	304	314	323	333	343	353	364	374	386	397	409	421	434	447	461	474	489
967	996	1,026	1,057	1,089	1,121	1,155	1,190	1,225	1,262	1,300	1,339	1,379	1,421	1,463	1,507	1,552	1,599	1,647	1,696	1,747	1,800	1,853	1,909	1,966	2,025	2,086	2,149	2,213
3,042	3,134	3,228	3,324	3,424	3,527	3,633	3,742	3,854	3,969	4,089	4,211	4,338	4,468	4,602	4,740	4,882	5,028	5,179	5,335	5,495	5,659	5,829	6,004	6,184	6,370	6,561	6,758	6,960
7,102	7,315	7,535	7,761	7,993	8,233	8,480	8,735	8,997	9,267	9,545	9,831	10,126	10,430	10,743	11,065	11,397	11,739	12,091	12,454	12,827	13,212	13,608	14,017	14,437	14,870	15,316	15,776	16,249
1,047	1,078	1,111	1,144	1,178	1,214	1,250	1,288	1,326	1,366	1,407	1,449	1,493	1,537	1,584	1,631	1,680	1,730	1,782	1,836	1,891	1,948	2,006	2,066	2,128	2,192	2,258	2,325	2,395
3,731	3,843	3,958	4,077	4,199	4,325	4,455	4,589	4,726	4,868	5,014	5,165	5,320	5,479	5,644	5,813	5,987	6,167	6,352	6,543	6,739	6,941	7,149	7,364	7,585	7,812	8,046	8,288	8,537
1,409	1,451	1,495	1,540	1,586	1,634	1,683	1,733	1,785	1,839	1,894	1,951	2,009	2,069	2,131	2,195	2,261	2,329	2,399	2,471	2,545	2,621	2,700	2,781	2,864	2,950	3,039	3,130	3,224
1,106	1,139	1,173	1,208	1,244	1,282	1,320	1,360	1,400	1,442	1,486	1,530	1,576	1,623	1,672	1,722	1,774	1,827	1,882	1,939	1,997	2,057	2,118	2,182	2,247	2,315	2,384	2,456	2,529
18,618	19,176	19,752	20,344	20,955	21,583	22,231	22,898	23,585	24,292	25,021	25,771	26,545	27,341	28,161	29,006	29,876	30,773	31,696	32,647	33,626	34,635	35,674	36,744	37,846	38,982	40,151	41,356	42,596
54,046	55,197	56,375	57,581	58,815	60,078	61,371	62,696	64,051	65,439	66,860	68,315	69,805	71,331	72,893	74,494	76,132	77,811	79,530	81,291	83,095	84,943	86,835	88,775	90,761	92,797	94,882	97,019	99,209

NORTH WATER SYSTEM

RESIDENTIAL WATER SERVICE

Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)			
City of Airdrie	\$ 30.52	-	10	0.4570	10+		\$ 37.38	\$ 448.50	35.9%
City of Calgary	\$ 8.68	0.7882		-			\$ 28.39	\$ 340.62	3.2%
City of Camrose	\$ 15.93	1.1270					\$ 44.11	\$ 529.26	60.4%
City of Drumheller	\$ 22.00		18	0.8200	>18		\$ 27.74	\$ 332.88	0.9%
City of Edmonton	\$ 3.55	0.9422	60	1.0073	>60		\$ 27.11	\$ 325.26	-1.4%
City of Fort Saskatchewan	\$ 12.50		10	1.0000	11+		\$ 27.50	\$ 330.00	0.0%
City of Fort McMurray	\$ 13.07	0.7657	23	1.0188	45	1.0457 46+	\$ 32.72	\$ 392.62	19.0%
City of Grande Prairie	\$ 5.00	0.8140					\$ 25.35	\$ 304.20	-7.8%
City of Leduc	\$ 7.45	0.8436					\$ 28.54	\$ 342.48	3.8%
City of Lethbridge	\$ 16.78	0.4120					\$ 27.08	\$ 324.96	-1.5%
City of Lloydminster	\$ 11.80		9.1	1.2254	4.5	1.1990 4.5	\$ 31.30	\$ 375.54	13.8%
City of Medicine Hat	\$ 7.03	0.3622					\$ 16.09	\$ 193.02	-41.5%
Parkland County	\$ 25.00	1.1500					\$ 25.00	\$ 300.00	-9.1%
City of Red Deer	\$ 9.68	0.3672					\$ 18.86	\$ 226.32	-31.4%
City of St. Albert	\$ 2.00	0.6417					\$ 18.04	\$ 216.51	-34.4%
City of Spruce Grove	\$ 4.01	1.1400	(for water service only - \$1.5740 for W&S)				\$ 21.11	\$ 253.32	-23.2%
Strathcona County	\$ 5.36	0.8000					\$ 25.36	\$ 304.32	-7.6%
City of Wetaskiwin	\$ 9.80	0.8600	57	0.7211	>57		\$ 31.30	\$ 375.60	13.8%
Average Monthly Use (m ³)	25.0	5/8" meter							

* Combined water/sewer: 60% to water

NORTH WATER SYSTEM

COMMERCIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Monthly Bill	Cost	Cost
	Charge	(\$/m3)	(m3)	(\$/m3)	(m3)	(\$/m3)	(m3)			
City of Airdrie	\$ 225.22	-	10	0.4570	10+			\$ 305.20	\$ 3,662.34	59.8%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 289.67	\$ 3,476.09	51.7%
City of Camrose	\$ 15.93	1 1.1270						\$ 224.43	\$ 2,693.10	17.5%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 158.94	\$ 1,907.28	-16.8%
City of Edmonton	\$ 16.15	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 205.54	\$ 2,466.52	7.6%
City of Fort McMurray	\$ 99.74	0.9614	23	0.9846	45	1.0110	>46	\$ 285.05	\$ 3,420.64	49.2%
City of Fort Saskatchewan	\$ 18.50		12.5	1.0000	>12.5			\$ 191.00	\$ 2,292.00	0.0%
City of Grande Prairie	\$ 40.00	0.8150						\$ 190.78	\$ 2,289.30	-0.1%
City of Leduc	\$ 77.52	0.8633						\$ 237.23	\$ 2,846.77	24.2%
City of Lethbridge	\$ 42.91	0.7990	75	0.6180	675	0.4370	1,750	\$ 259.51	\$ 3,114.06	35.9%
City of Lloydminster	\$ 7.03		22.6	1.1660	113.6	0.9460	318	\$ 180.69	\$ 2,168.26	-5.4%
City of Medicine Hat	\$ 9.03	0.3622						\$ 75.04	\$ 912.44	-60.2%
Parkland County	\$ 25.00	1.1500						\$ 237.75	\$ 2,853.00	24.5%
City of Red Deer	\$ 159.01	0.3673						\$ 226.96	\$ 2,723.53	18.8%
City of St. Albert	\$ 14.22	0.6417						\$ 132.93	\$ 1,595.21	-30.4%
City of Spruce Grove	\$ 21.01	1.1400						\$ 231.91	\$ 2,782.92	21.4%
Strathcona County	\$ 4.85	0.6817						\$ 130.96	\$ 1,571.57	-31.4%
City of Wetaskiwin	\$ 39.40	0.8566	57	0.7211	>57			\$ 180.46	\$ 2,165.51	-5.5%
Average Monthly Use (m³)	185.0	2" meter								

NORTH WATER SYSTEM

INDUSTRIAL WATER SERVICE

	Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
		Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)			
City of Airdrie	\$ 878.40	-	10	0.4570	10+			\$ 3,158.83	\$ 37,905.96	-37.0%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 2,262.38	\$ 27,148.56	-54.9%
City of Camrose	\$ 15.93	1.1270						\$ 5,650.93	\$ 67,811.16	12.7%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 4,107.24	\$ 49,286.88	-18.1%
City of Edmonton	\$ 57.80	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 3,462.65	\$ 41,551.80	-31.0%
City of Fort McMurray	\$ 227.80	0.9614	23	0.9846	45	1.0110	>46	\$ 5,281.08	\$ 63,372.94	5.3%
City of Fort Saskatchewan	\$ 28.00		12.5	1.0000	>12.5			\$ 5,015.50	\$ 60,186.00	0.0%
City of Grande Prairie	\$ 157.50	0.8150						\$ 4,232.50	\$ 50,790.00	-15.6%
City of Leduc	\$ 310.99	0.8633						\$ 4,627.49	\$ 55,529.88	-7.7%
City of Lethbridge	\$ 124.77	0.4120						\$ 2,184.77	\$ 26,217.24	-56.4%
City of Lloydminster	\$ 13.15		9	1.3620	13.5	1.3356	18	\$ 6,679.26	\$ 80,151.08	33.2%
City of Medicine Hat	\$ 9.03	0.3622						\$ 1,820.03	\$ 21,840.36	-63.7%
Parkland County	\$ 25.00	1.1500						\$ 5,775.00	\$ 69,300.00	15.1%
City of Red Deer	\$ 568.34	0.3673						\$ 2,404.84	\$ 28,858.08	-52.1%
City of St. Albert	\$ 56.89	0.6417						\$ 3,265.39	\$ 39,184.68	-34.9%
City of Spruce Grove	\$ 431.64	1.1400						\$ 6,131.64	\$ 73,579.68	22.3%
Strathcona County	\$ 4.85	0.6817						\$ 3,413.35	\$ 40,960.20	-31.9%
City of Wetaskiwin	\$ 62.90	0.8566	57	0.7211	>57			\$ 3,676.06	\$ 44,112.67	-26.7%
Average Monthly Use (m³)	5,000.0	4" Meter								

NORTH WATER SYSTEM

Option 1 - Purchase Water, Blackfalds, Lacombe and Ponoka

Amortization Table

A simple amortization table covering 24 payment periods of a loan.

1) To use the table, simply change any of the values in the "initial data" area of the worksheet.

2) To print the table, just choose "Print" from the "File" menu. The print area is already defined.

Initial Data

LOAN DATA		TABLE DATA	
Loan amount:	\$7,879,802	Table starts at date:	
Annual interest rate:	6.250%	or at payment number:	1
Term in years:	20		
Payments per year:	1		0.029208544
First payment due:	12/31/2002		

PERIODIC PAYMENT

Entered payment:

Calculated payment: \$701,005.05

The table uses the calculated periodic payment amount unless you enter a value for "Entered payment".

CALCULATIONS

Use payment of: \$701,005.05

Beginning balance at payment 1: 7,879,801.85

1st payment in table: 1

Cumulative interest prior to payment 1: 0.00

Table

No.	Payment Date	Beginning Balance	Interest	Principal	Ending Balance	Cumulative Interest
1	12/31/2002	7,879,801.85	492,487.62	208,517.43	7,671,284.42	492,487.62
2	12/31/2003	7,671,284.42	479,455.28	221,549.77	7,449,734.65	971,942.89
3	12/31/2004	7,449,734.65	465,608.42	235,396.63	7,214,338.01	1,437,551.31
4	12/31/2005	7,214,338.01	450,896.13	250,108.92	6,964,229.09	1,888,447.43
5	12/31/2006	6,964,229.09	435,264.32	265,740.73	6,698,488.36	2,323,711.75
6	12/31/2007	6,698,488.36	418,655.52	282,349.53	6,416,138.83	2,742,367.27
7	12/31/2008	6,416,138.83	401,008.68	299,996.37	6,116,142.45	3,143,375.95
8	12/31/2009	6,116,142.45	382,258.90	318,746.15	5,797,396.31	3,525,634.85
9	12/31/2010	5,797,396.31	362,337.27	338,667.78	5,458,728.53	3,887,972.12
10	12/31/2011	5,458,728.53	341,170.53	359,834.52	5,098,894.01	4,229,142.66
11	12/31/2012	5,098,894.01	318,680.88	382,324.17	4,716,569.84	4,547,823.53
12	12/31/2013	4,716,569.84	294,785.61	406,219.44	4,310,350.40	4,842,609.15
13	12/31/2014	4,310,350.40	269,396.90	431,608.15	3,878,742.25	5,112,006.05
14	12/31/2015	3,878,742.25	242,421.39	458,583.66	3,420,158.59	5,354,427.44
15	12/31/2016	3,420,158.59	213,759.91	487,245.14	2,932,913.45	5,568,187.35
16	12/31/2017	2,932,913.45	183,307.09	517,697.96	2,415,215.49	5,751,494.44
17	12/31/2018	2,415,215.49	150,950.97	550,054.08	1,865,161.41	5,902,445.41
18	12/31/2019	1,865,161.41	116,572.59	584,432.46	1,280,728.95	6,019,018.00
19	12/31/2020	1,280,728.95	80,045.56	620,959.49	659,769.46	6,099,063.56
20	12/31/2021	659,769.46	41,235.59	659,769.46	0.00	6,140,299.15

NORTH WATER SYSTEM
Utility Rate Base

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. Gross Plant In Service (Schedule "A-1")										
a) Opening Balance	-	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601
b) Additions	29,713,601	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601	29,713,601
2. Accumulated Depreciation (Schedule "A-2")										
a) Opening Balance	-	395,554	1,186,663	1,977,772	2,768,881	3,559,990	4,351,099	5,142,208	5,933,317	6,724,425
b) Additions	395,554	791,109	791,109	791,109	791,109	791,109	791,109	791,109	791,109	791,109
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	395,554	1,186,663	1,977,772	2,768,881	3,559,990	4,351,099	5,142,208	5,933,317	6,724,425	7,515,534
3. Net Plant In Service										
a) Opening Balance (Line 1. a) - Line 2. a))	-	29,318,046	28,526,938	27,735,829	26,944,720	26,153,611	25,362,502	24,571,393	23,780,284	22,989,175
b) Closing Balance (Line 1. d) - Line 2. d))	29,318,046	28,526,938	27,735,829	26,944,720	26,153,611	25,362,502	24,571,393	23,780,284	22,989,175	22,198,067
c) Total	29,318,046	57,844,984	56,262,766	54,680,549	53,098,331	51,516,113	49,933,895	48,351,678	46,769,460	45,187,242
d) Mid Year Balance	14,659,023	28,922,492	28,131,383	27,340,274	26,549,165	25,758,057	24,966,948	24,175,839	23,384,730	22,593,621
4. Necessary Working Capital										
a) Cash Expenses Incl. Water Purchases(Schedule "D")	422,008	940,102	1,040,465	1,087,185	1,135,591	1,185,737	1,237,682	1,291,482	1,363,892	1,439,115
b) One-Eighth of Cash Expenses	52,751	117,513	130,058	135,898	141,949	148,217	154,710	161,435	170,486	179,889
c) Prepaid Expenses	-	-	-	-	-	-	-	-	-	-
d) O&M Inventory	-	-	-	-	-	-	-	-	-	-
e) Necessary Working Capital (b+c+d)	52,751	117,513	130,058	135,898	141,949	148,217	154,710	161,435	170,486	179,889
5. Utility Rate Base @ Mid Year	<u>14,711,774</u>	<u>29,040,005</u>	<u>28,261,441</u>	<u>27,476,172</u>	<u>26,691,114</u>	<u>25,906,274</u>	<u>25,121,658</u>	<u>24,337,274</u>	<u>23,555,216</u>	<u>22,773,510</u>

NORTH WATER SYSTEM
Continuity Schedule of Fixed Assets

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>Land & Land Rights</u>	<u>River Intake/ LowLift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2001	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2002	0	0	0	0	0	0	0	0	0
Additions	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Retirements									0
2003	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2004	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2005	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2006	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2007	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2008	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2009	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2010	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2011	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0
2012	2,343,379	1,380,844	1,380,844	6,196,738	6,196,738	11,476,775	533,572	204,713	29,713,601
Additions									0
Retirements									0

NORTH WATER SYSTEM
Continuity Schedule of Accumulated Depreciation

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>River Intake/ Low Lift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2001	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2002	0	0	0	0	0	0	0	0
Additions	13,808	34,521	61,967	154,918	114,768	5,336	10,236	395,554
Retirements								0
2003	13,808	34,521	61,967	154,918	114,768	5,336	10,236	395,554
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2004	41,425	103,563	185,902	484,755	344,303	16,007	30,707	1,186,663
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2005	69,042	172,605	309,837	774,592	573,839	26,679	51,178	1,977,772
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2006	98,659	241,648	433,772	1,084,429	803,374	37,350	71,649	2,768,881
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2007	124,276	310,690	557,706	1,394,268	1,032,910	48,021	92,121	3,559,990
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2008	151,893	379,732	681,641	1,704,103	1,262,445	58,693	112,592	4,351,099
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2009	179,510	448,774	805,576	2,013,940	1,491,981	69,364	133,063	5,142,208
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2010	207,127	517,816	929,511	2,323,777	1,721,516	80,036	153,534	5,933,317
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2011	234,743	586,859	1,053,445	2,633,613	1,951,052	90,707	174,006	6,724,425
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
2012	262,360	655,901	1,177,380	2,943,450	2,180,587	101,379	194,477	7,515,534
Additions	27,617	69,042	123,935	309,837	229,536	10,671	20,471	791,109
Retirements								0
Useful Service Life	50	20	50	20	50	50	10	
Depreciation Rate	2.00%	5.00%	2.00%	5.00%	2.00%	2.00%	10.00%	

NORTH WATER SYSTEM
Continuity Schedule of No-Cost Capital

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions				0
Retirements				0
2001	0	0	0	0
Additions				0
Retirements				0
2002	0	0	0	0
Additions	12,063,722			12,063,722
Retirements				0
2003	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2004	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2005	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2006	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2007	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2008	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2009	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2010	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2011	12,063,722	0	0	12,063,722
Additions				0
Retirements				0
2012	12,063,722	0	0	12,063,722
Additions				0
Retirements				0

NORTH WATER SYSTEM
Continuity Schedule of Amortization of No-Cost Capital

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions	0	0	0	0
Retirements				0
2001	0	0	0	0
Additions	0	0	0	0
Retirements				0
2002	0	0	0	0
Additions	120,637	0	0	120,637
Retirements				0
2003	120,637	0	0	120,637
Additions	241,274	0	0	241,274
Retirements				0
2004	361,912	0	0	361,912
Additions	241,274	0	0	241,274
Retirements				0
2005	603,186	0	0	603,186
Additions	241,274	0	0	241,274
Retirements				0
2006	844,461	0	0	844,461
Additions	241,274	0	0	241,274
Retirements				0
2007	1,085,735	0	0	1,085,735
Additions	241,274	0	0	241,274
Retirements				0
2008	1,327,009	0	0	1,327,009
Additions	241,274	0	0	241,274
Retirements				0
2009	1,588,284	0	0	1,588,284
Additions	241,274	0	0	241,274
Retirements				0
2010	1,809,558	0	0	1,809,558
Additions	241,274	0	0	241,274
Retirements				0
2011	2,050,833	0	0	2,050,833
Additions	241,274	0	0	241,274
Retirements				0
2012	2,292,107	0	0	2,292,107
Additions	241,274	0	0	241,274
Retirements				0
Useful Service Life	50	50	50	
Amortization Rate	2.00%	2.00%	2.00%	

NORTH WATER SYSTEM
Capitalization, Cost of Capital and Return
Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	Year 1	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		8,591,412	58.40%	98.30%	8,591,412	6.25%	536,963
2. Equity		148,820	1.01%	1.70%	148,820	9.25%	13,766
3. Sub Total		8,740,232	59.41%	100.00%	8,740,232	8.30%	550,729
4. No-Cost Capital (Schedule "B-2")		5,971,542	40.59%		5,971,542	0.00%	-
5. Total		14,711,774	100.00%		14,711,774	3.74%	550,729
	Year 2	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		16,934,700	58.32%	98.36%	16,934,700	6.25%	1,058,419
2. Equity		282,858	0.97%	1.64%	282,858	9.25%	26,164
3. Sub Total		17,217,557	59.29%	100.00%	17,217,557	6.30%	1,084,583
4. No-Cost Capital (Schedule "B-2")		11,822,448	40.71%		11,822,448	0.00%	-
5. Total		29,040,005	100.00%		29,040,005	3.73%	1,084,583
	Year 3	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		16,422,945	58.11%	98.46%	16,422,945	6.25%	1,026,434
2. Equity		257,323	0.91%	1.54%	257,323	9.25%	23,802
3. Sub Total		16,680,268	59.02%	100.00%	16,680,268	6.30%	1,050,236
4. No-Cost Capital (Schedule "B-2")		11,581,173	40.98%		11,581,173	0.00%	-
5. Total		28,261,441	100.00%		28,261,441	3.72%	1,050,236
	Year 4	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		15,879,208	57.79%	98.41%	15,879,208	6.25%	992,450
2. Equity		257,068	0.94%	1.59%	257,068	9.25%	23,779
3. Sub Total		16,136,274	58.73%	100.00%	16,136,274	6.30%	1,016,229
4. No-Cost Capital (Schedule "B-2")		11,339,899	41.27%		11,339,899	0.00%	-
5. Total		27,476,172	100.00%		27,476,172	3.70%	1,016,229
	Year 5	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		15,301,483	57.33%	98.13%	15,301,483	6.25%	956,343
2. Equity		291,007	1.09%	1.87%	291,007	9.25%	26,918
3. Sub Total		15,592,490	58.42%	100.00%	15,592,490	6.31%	983,261
4. No-Cost Capital (Schedule "B-2")		11,098,624	41.58%		11,098,624	0.00%	-
5. Total		26,691,114	100.00%		26,691,114	3.68%	983,261
	Year 6	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		14,687,652	56.70%	97.60%	14,687,652	6.25%	917,978
2. Equity		361,271	1.39%	2.40%	361,271	9.25%	33,418
3. Sub Total		15,048,924	58.09%	100.00%	15,048,924	6.32%	951,396
4. No-Cost Capital (Schedule "B-2")		10,857,350	41.91%		10,857,350	0.00%	-
5. Total		25,906,274	100.00%		25,906,274	3.67%	951,396
	Year 7	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		14,035,457	55.87%	96.76%	14,035,457	6.25%	877,216
2. Equity		470,125	1.87%	3.24%	470,125	9.25%	43,487
3. Sub Total		14,505,582	57.74%	100.00%	14,505,582	6.35%	920,703
4. No-Cost Capital (Schedule "B-2")		10,616,075	42.26%		10,616,075	0.00%	-
5. Total		25,121,658	100.00%		25,121,658	3.66%	920,703
	Year 8	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		13,342,500	54.82%	95.56%	13,342,500	6.25%	833,906
2. Equity		619,973	2.55%	4.44%	619,973	9.25%	57,347
3. Sub Total		13,962,473	57.37%	100.00%	13,962,473	6.38%	891,254
4. No-Cost Capital (Schedule "B-2")		10,374,801	42.63%		10,374,801	0.00%	-
5. Total		24,337,274	100.00%		24,337,274	3.66%	891,254
	Year 9	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		12,606,233	53.52%	93.92%	12,606,233	6.25%	787,890
2. Equity		815,457	3.46%	6.08%	815,457	9.25%	75,430
3. Sub Total		13,421,690	56.98%	100.00%	13,421,690	6.43%	863,319
4. No-Cost Capital (Schedule "B-2")		10,133,526	43.02%		10,133,526	0.00%	-
5. Total		23,555,216	100.00%		23,555,216	3.67%	863,319
	Year 10	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		11,823,950	51.92%	91.79%	11,823,950	6.25%	738,997
2. Equity		1,057,309	4.64%	8.21%	1,057,309	9.25%	97,801
3. Sub Total		12,881,258	56.56%	100.00%	12,881,258	6.50%	836,798
4. No-Cost Capital (Schedule "B-2")		9,892,252	43.44%		9,892,252	0.00%	-
5. Total		22,773,510	100.00%		22,773,510	3.67%	836,798

Schedule "B"

**NORTH WATER SYSTEM
Composite Cost of Debt**

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

Debenture Number	Allocation to Water	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	100.00%	6.25%	-	17,182,823	16,686,576	16,159,314	15,599,098	15,003,868	14,371,437	13,699,478	12,985,522	12,226,944	11,420,955
Total Debenture Debt @ Year-End			-	17,182,823	16,686,576	16,159,314	15,599,098	15,003,868	14,371,437	13,699,478	12,985,522	12,226,944	11,420,955
Average Cost of Debt				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

Debenture Number	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	6.25%		8,591,412	16,934,700	16,422,945	15,879,206	15,301,483	14,687,652	14,035,457	13,342,500	12,606,233	11,823,950
Total Debenture Debt @ Mid-Year			8,591,412	16,934,700	16,422,945	15,879,206	15,301,483	14,687,652	14,035,457	13,342,500	12,606,233	11,823,950
Cost of Debt @ Mid-Year				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

NORTH WATER SYSTEM
Calculation of No-Cost Capital @ Mid-Year

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. No-Cost Capital (Contributions & Grants, Schedule "A-3")										
a) Opening Balance	-	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722
b) Additions	12,063,722	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722	12,063,722
2. Accumulated Amortization (Schedule "A-4")										
a) Opening Balance	-	120,637	361,912	603,186	844,461	1,085,735	1,327,009	1,568,284	1,809,558	2,050,833
b) Additions	120,637	241,274	241,274	241,274	241,274	241,274	241,274	241,274	241,274	241,274
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	120,637	361,912	603,186	844,461	1,085,735	1,327,009	1,568,284	1,809,558	2,050,833	2,292,107
3. Net No-Cost Capital										
a) Opening Balance (Line 1. a) - Line 2. a))	-	11,943,085	11,701,810	11,460,536	11,219,261	10,977,987	10,736,713	10,495,438	10,254,164	10,012,889
b) Closing Balance (Line 1. d) - Line 2. d))	11,943,085	11,701,810	11,460,536	11,219,261	10,977,987	10,736,713	10,495,438	10,254,164	10,012,889	9,771,615
c) Total	11,943,085	23,644,895	23,162,346	22,679,797	22,197,248	21,714,700	21,232,151	20,749,602	20,267,053	19,784,504
4. Net No-Cost Capital @ Mid-Year	<u>5,971,542</u>	<u>11,822,448</u>	<u>11,581,173</u>	<u>11,339,899</u>	<u>11,098,624</u>	<u>10,857,350</u>	<u>10,616,075</u>	<u>10,374,801</u>	<u>10,133,526</u>	<u>9,892,252</u>

NORTH WATER SYSTEM
Utility Revenue Requirement and Postage Stamp Rate

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	Year 1 (Notes 1, 2)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1. Water Purchases	-	-	-	-	-	-	-	-	-	-
2. Net Cash Operating Expenses (Schedule "D")	422,008	940,102	1,040,465	1,087,185	1,135,591	1,185,737	1,237,682	1,291,482	1,363,892	1,439,115
3. Non-Cash Expenses										
a) Depreciation (Schedule "A-2")	395,554	791,109	791,109	791,109	791,109	791,109	791,109	791,109	791,109	791,109
b) Amortization of NCC (Schedule "A-4")	(120,637)	(241,274)	(241,274)	(241,274)	(241,274)	(241,274)	(241,274)	(241,274)	(241,274)	(241,274)
c) Total	274,917	549,834	549,834	549,834	549,834	549,834	549,834	549,834	549,834	549,834
4. Return (Schedule "B")	550,729	1,084,583	1,050,238	1,016,229	983,261	951,396	920,703	891,254	863,319	836,798
5. Gross Revenue Requirement	1,247,654	2,574,519	2,640,536	2,653,249	2,668,686	2,686,968	2,708,219	2,732,570	2,777,045	2,825,747
6. Total Water Consumption (m ³ /year)	1,535,480	3,544,232	4,017,504	4,141,908	4,266,308	4,390,710	4,515,112	4,639,514	4,852,550	5,065,586
7. Average Wholesale Cost of Water (\$/m ³)	0.813	0.726	0.657	0.641	0.626	0.612	0.600	0.589	0.572	0.558

Notes:

1. Year 1 is assumed to be 2002
2. Assuming Operation mid-year, July 1 of year 1

**NORTH WATER SYSTEM
Cash Operating Expenses**

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

Account Code	Year 1 (Note 1)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Maintenance	189,313	194,046	198,897	203,869	208,966	214,190	219,545	225,034	230,660	236,426
Operators	180,000	184,500	189,113	193,840	198,686	203,653	208,745	213,963	219,313	224,795
Power	118,693	140,410	163,138	172,394	182,011	192,002	202,378	213,153	228,514	244,509
Heating	77,682	91,895	106,770	112,828	119,123	125,661	132,452	139,504	149,557	160,026
Chemicals	278,327	329,251	382,547	404,253	426,804	450,231	474,562	499,828	535,849	573,358
Totals	422,008	940,102	1,040,465	1,087,185	1,135,591	1,185,737	1,237,682	1,291,482	1,363,892	1,439,115

Note 1: Half year total for Year 1 of operation (assumed to be 2002)

NORTH WATER SYSTEM
Population

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

2001 - 2054		Population Projections																								
		Present 2001	2002	2003	1 2004	2005	2006	2007	2008	5 2009	2,010	2,011	2,012	2,013	10 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	20 2024	2025
Blackfalds		3,300	3,600	3,900	4,300	4,401	4,504	4,610	4,719	4,830	4,943	5,059	5,178	5,300	5,424	5,552	5,682	5,816	5,952	6,092	6,236	6,382	6,532	6,686	6,843	7,003
Lacombe		9,232	9,600	10,800	12,232	12,599	12,977	13,366	13,767	14,180	14,606	14,825	15,047	15,273	15,502	15,734	15,970	16,210	16,453	16,700	16,950	17,205	17,463	17,725	17,991	18,260
Ponoka		6,703	6,804	6,906	7,009	7,114	7,221	7,329	7,439	7,551	7,664	7,779	7,896	8,014	8,134	8,256	8,380	8,506	8,634	8,763	8,895	9,028	9,163	9,301	9,440	9,582
Hobbema																										
	Montana - Urban	102	105	108	111	115	118	122	125	129	133	137	141	145	150	154	159	164	169	174	179	184	190	195	201	207
	Montana - Rural	462	476	490	505	520	536	552	568	585	603	621	640	659	678	699	720	741	764	787	810	834	859	885	912	939
	Samson - Urban	1,453	1,497	1,541	1,588	1,635	1,684	1,735	1,787	1,841	1,896	1,953	2,011	2,072	2,134	2,198	2,264	2,332	2,402	2,474	2,548	2,624	2,703	2,784	2,868	2,954
	Samson - Rural	3,392	3,494	3,599	3,707	3,818	3,932	4,050	4,172	4,297	4,426	4,559	4,695	4,836	4,981	5,131	5,285	5,443	5,606	5,775	5,948	6,126	6,310	6,499	6,694	6,895
	Ermineskin - Urban	500	515	530	546	563	580	597	615	633	652	672	692	713	734	756	779	802	826	851	877	903	930	958	987	1,016
	Ermineskin - Rural	1,782	1,835	1,891	1,947	2,006	2,066	2,128	2,192	225700%	2,325	2,395	2,467	2,541	2,617	2,695	2,776	2,860	2,945	3,034	3,125	3,218	3,315	3,414	3,517	3,622
	Louis Bull - Urban	673	693	714	735	757	780	804	828	853	878	904	932	960	988	1,018	1,049	1,080	1,112	1,146	1,180	1,216	1,252	1,290	1,328	1,368
	Louis Bull - Rural	528	544	560	577	594	612	630	649	669	689	710	731	753	775	799	823	847	873	899	926	954	982	1,012	1,042	1,073
	Total Hobbema	8,892	9,159	9,434	9,717	10,008	10,308	10,618	10,936	11,264	11,602	11,950	12,309	12,678	13,058	13,450	13,853	14,269	14,697	15,138	15,592	16,060	16,542	17,038	17,549	18,076
		28,127	29,162	31,039	33,258	34,122	35,011	35,923	36,861	37,825	38,815	39,613	40,430	41,265	42,119	42,993	43,886	44,801	45,736	46,693	47,673	48,675	49,700	50,749	51,823	52,921

Assumptions

Blackfalds - Add a further 1,000 in 3 years and then 2.35% annual increase thereafter

Lacombe - Add further 3,000 in 3 years due to Meridian/Industrial Growth, 3% annual increase until 2010 and 1.5% annual increase thereafter

Ponoka - 1.5% annual increase

Hobbema - 3.0% annual increase

November																										
December (est)	16,614	68,346	518	43,288	144,435	3,899		277,100																		
Yearly Totals	16,614	68,346	518	43,288	144,435	3,899	0	277,100																		

NORTH WATER SYSTEM
Population
Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

2026	2027	2028	2029	2030	2031	2032	2033	30 2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	40 2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	50 2054
7,168	7,337	7,509	7,685	7,866	8,051	8,240	8,434	8,632	8,835	9,042	9,255	9,472	9,695	9,923	10,156	10,395	10,639	10,889	11,145	11,407	11,675	11,949	12,230	12,517	12,811	13,112	13,421	13,736
18,534	18,812	19,095	19,381	19,672	19,967	20,266	20,570	20,879	21,192	21,510	21,833	22,160	22,492	22,830	23,172	23,520	23,873	24,231	24,594	24,963	25,338	25,718	26,103	26,495	26,892	27,296	27,705	28,121
9,726	9,872	10,020	10,170	10,322	10,477	10,634	10,794	10,956	11,120	11,287	11,456	11,628	11,803	11,980	12,159	12,342	12,527	12,715	12,906	13,099	13,296	13,495	13,697	13,903	14,111	14,323	14,538	14,756
214	220	227	233	240	248	255	263	271	279	287	296	304	314	323	333	343	353	364	374	386	397	409	421	434	447	461	474	489
967	996	1,026	1,057	1,089	1,121	1,155	1,190	1,225	1,262	1,300	1,339	1,379	1,421	1,463	1,507	1,552	1,599	1,647	1,696	1,747	1,800	1,853	1,909	1,966	2,025	2,086	2,149	2,213
3,042	3,134	3,228	3,324	3,424	3,527	3,633	3,742	3,854	3,969	4,089	4,211	4,338	4,468	4,602	4,740	4,882	5,028	5,179	5,335	5,495	5,659	5,829	6,004	6,184	6,370	6,561	6,758	6,960
7,102	7,315	7,535	7,761	7,993	8,233	8,480	8,735	8,997	9,267	9,545	9,831	10,126	10,430	10,743	11,065	11,397	11,739	12,091	12,454	12,827	13,212	13,608	14,017	14,437	14,870	15,316	15,776	16,249
1,047	1,078	1,111	1,144	1,178	1,214	1,250	1,288	1,326	1,366	1,407	1,449	1,493	1,537	1,584	1,631	1,680	1,730	1,782	1,836	1,891	1,948	2,006	2,066	2,128	2,192	2,258	2,325	2,395
3,731	3,843	3,958	4,077	4,199	4,325	4,455	4,589	4,726	4,868	5,014	5,165	5,320	5,479	5,644	5,813	5,987	6,167	6,352	6,543	6,739	6,941	7,149	7,364	7,585	7,812	8,046	8,288	8,537
1,409	1,451	1,495	1,540	1,586	1,634	1,683	1,733	1,785	1,839	1,894	1,951	2,009	2,069	2,131	2,195	2,261	2,329	2,399	2,471	2,545	2,621	2,700	2,781	2,864	2,950	3,039	3,130	3,224
1,106	1,139	1,173	1,208	1,244	1,282	1,320	1,360	1,400	1,442	1,486	1,530	1,576	1,623	1,672	1,722	1,774	1,827	1,882	1,939	1,997	2,057	2,118	2,182	2,247	2,315	2,384	2,456	2,529
18,618	19,176	19,752	20,344	20,955	21,583	22,231	22,898	23,585	24,292	25,021	25,771	26,545	27,341	28,161	29,006	29,876	30,773	31,696	32,647	33,626	34,635	35,674	36,744	37,846	38,982	40,151	41,356	42,596
54,046	55,197	56,375	57,581	58,815	60,078	61,371	62,696	64,051	65,439	66,860	68,315	69,805	71,331	72,893	74,494	76,132	77,811	79,530	81,291	83,095	84,943	86,835	88,775	90,761	92,797	94,882	97,019	99,209

NORTH WATER SYSTEM

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

	Present - 2001			Estimated 2002 Consumption M³ / Year	Estimated 2003 Consumption M³ / Year	Future - 2004			Estimated 2005 Consumption M³ / Year	Estimated 2006 Consumption M³ / Year	Estimated 2007 Consumption M³ / Year	Estimated 2008 Consumption M³ / Year	5 Year Future - 2009			Estimated 2010 Consumption M³ / Year	Estimated 2011 Consumption M³ / Year	Estimated 2012 Consumption M³ / Year	Estimated 2013 Consumption M³ / Year	10 Year Future - 2014			20 Year Future - 2024			50 Year Future - 2054								
	Population	Consumption				Population	Consumption						Population	Consumption						Population	Consumption		Population	Consumption		Population	Consumption		Population	Consumption		Population	Consumption	
		Litre/Sec	M³ / Year				Litre/Sec	M³ / Year						Litre/Sec	M³ / Year						Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year		Litre/Sec	M³ / Year
Blackfalds	3,300	14.1	445,665	490,682	535,698	4,300	18.4	580,715	595,018	609,322	623,625	637,929	4,830	20.7	652,232	668,297	684,362	700,427	716,492	5,424	23.2	732,557	6,843	29.3	924,102	13,736	58.8	1,855,049						
Lacombe																																		
Urban	9,232	39.5	1,246,782	1,381,832	1,516,882	12,232	52.4	1,651,932					14,180	60.7	1,915,041					15,502	66.4	2,093,532	17,991	77.0	2,429,629	28,121	120.4	3,797,705						
Industrial			-				15.0	473,040						20.0	630,720						40.0	1,261,440		40.0	1,261,440		40.0	1,261,440						
Total Lacombe	9,232	39.5	1,246,782	1,539,512	1,832,242	12,232	67.4	2,124,972	2,209,130	2,293,288	2,377,446	2,461,604	14,180	80.7	2,545,761	2,707,604	2,869,446	3,031,288	3,193,130	15,502	106.4	3,354,972	17,991	117.0	3,691,069	28,121	160.4	5,059,145						
Ponoka	6,703	28.7	905,240	919,023	932,807	7,009	30.0	946,590	961,221	975,853	990,484	1,005,115	7,551	32.3	1,019,746	1,035,508	1,051,270	1,067,032	1,082,794	8,134	34.8	1,098,556	9,440	40.4	1,274,920	14,756	63.2	1,992,802						
Other Industrial/ Residential Uses *				121,743	243,485		11.6	365,228	376,537	387,846	399,155	410,465		13.4	421,774	441,141	460,508	479,875	499,242		16.4	518,609		18.7	589,009		28.2	890,700						
Total Consumption - Towns			2,597,687	3,070,959	3,544,232			4,017,504	4,141,906	4,266,308	4,390,710	4,515,112		4,639,514	4,852,550	5,065,586	5,278,622	5,491,658																
Hobbema																																		
Montana - Urban	102	0.4	13,775	14,201	14,627	111	0.5	15,052	15,532	16,011	16,491	16,970	129	0.6	17,450	18,006	18,562	19,117	19,673	150	0.6	20,229	201	0.9	27,186	489	2.1	65,988						
Montana - Rural	462	0.5	15,177	15,646	16,115	505	0.5	16,584	20,957	25,331	29,704	34,077	585	1.2	38,451	39,676	40,900	42,125	43,350	678	1.4	44,575	912	1.9	59,905	2,213	4.6	145,405						
Samson - Urban	1,453	6.2	196,228	202,293	208,358	1,588	6.8	214,423	221,254	228,084	234,914	241,745	1,841	7.9	248,575	256,494	264,412	272,330	280,249	2,134	9.1	288,167	2,868	12.3	387,272	6,960	29.8	940,011						
Samson - Rural	3,392	3.5	111,427	114,871	118,315	3,707	3.9	121,760	153,869	185,978	218,087	250,196	4,297	9.0	282,305	291,298	300,291	309,284	318,276	4,981	10.4	327,269	6,694	13.9	439,822	16,249	33.9	1,067,564						
Ermineskin - Urban	500	2.1	67,525	69,612	71,699	546	2.3	73,786	76,137	78,487	80,838	83,188	633	2.7	85,539	88,263	90,988	93,713	96,438	734	3.1	99,163	987	4.2	133,266	2,395	10.3	323,473						
Ermineskin - Rural	1,782	1.9	58,539	60,348	62,157	1,947	2.0	63,967	80,835	97,704	114,573	131,441	2,257	4.7	148,310	153,035	157,759	162,483	167,208	2,617	5.5	171,932	3,517	7.3	231,062	8,537	17.8	560,849						
Louis Bull - Urban	673	2.9	90,889	93,698	96,507	735	3.1	99,316	102,480	105,644	108,808	111,971	853	3.7	115,135	118,803	122,470	126,138	129,805	988	4.2	133,473	1,328	5.7	179,377	3,224	13.8	435,394						
Louis Bull - Rural	528	0.6	17,345	17,881	18,417	577	0.6	18,953	23,951	28,949	33,948	38,946	669	1.4	43,944	45,344	46,743	48,143	49,543	775	1.6	50,943	1,042	2.2	68,463	2,529	5.3	166,177						
Total Hobbema	8,892	18.1	570,904	588,550	606,196	9,717	19.8	623,842	695,015	766,189	837,362	908,535	11,264	31.1	979,709	1,010,917	1,042,126	1,073,334	1,104,543	13,058	36.0	1,135,751	17,549	48.4	1,526,354	42,596	117.5	3,704,863						
Total	28,127	100.5	3,168,591	3,659,509	4,150,428	33,258	147.2	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	37,825	178.2	5,619,223	5,863,467	6,107,712	6,351,956	6,596,201	42,119	216.9	6,840,445	51,823	253.9	8,005,454	99,209	428.2	13,502,558						

- Assumptions
- Urban Consumption based on 370 litres per person per day
 - Rural Consumption based on 180 litres per person per day
 - * at 10% of urban consumption of Blackfalds, Lacombe and Ponoka

NORTH WATER SYSTEM

RESIDENTIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service Charge	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Monthly Bill	Cost	Cost
City of Airdrie	\$ 30.52	-	10	0.4570	10+			\$ 37.38	\$ 448.50	35.9%
City of Calgary	\$ 8.68	0.7882		-		-		\$ 28.39	\$ 340.62	3.2%
City of Camrose	\$ 15.93	1.1270						\$ 44.11	\$ 529.26	60.4%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 27.74	\$ 332.88	0.9%
City of Edmonton	\$ 3.55	0.9422	60	1.0073	>60			\$ 27.11	\$ 325.26	-1.4%
City of Fort Saskatchewan	\$ 12.50		10	1.0000	11+			\$ 27.50	\$ 330.00	0.0%
City of Fort McMurray	\$ 13.07	0.7657	23	1.0188	45	1.0457	46+	\$ 32.72	\$ 392.62	19.0%
City of Grande Prairie	\$ 5.00	0.8140						\$ 25.35	\$ 304.20	-7.8%
City of Leduc	\$ 7.45	0.8436						\$ 28.54	\$ 342.48	3.8%
City of Lethbridge	\$ 16.78	0.4120						\$ 27.08	\$ 324.96	-1.5%
City of Lloydminster	\$ 11.80		9.1	1.2254	4.5	1.1990	4.5	\$ 31.30	\$ 375.54	13.8%
City of Medicine Hat	\$ 7.03	0.3622						\$ 16.09	\$ 193.02	-41.5%
Parkland County	\$ 25.00	1.1500						\$ 25.00	\$ 300.00	-9.1%
City of Red Deer	\$ 9.68	0.3672						\$ 18.86	\$ 226.32	-31.4%
City of St. Albert	\$ 2.00	0.6417						\$ 18.04	\$ 216.51	-34.4%
City of Spruce Grove	* \$ 4.01	1.1400	(for water service only - \$1.5740 for W&S)					\$ 21.11	\$ 253.32	-23.2%
Strathcona County	\$ 5.36	0.8000						\$ 25.36	\$ 304.32	-7.8%
City of Wetaskiwin	\$ 9.80	0.8600	57	0.7211	>57			\$ 31.30	\$ 375.60	13.8%
Average Monthly Use (m ³)	25.0	5/8" meter								

* Combined water/sewer: 60% to water

NORTH WATER SYSTEM

COMMERCIAL WATER SERVICE

	Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
		Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)			
City of Airdrie	\$ 225.22	-	10	0.4570	10+			\$ 305.20	\$ 3,662.34	59.8%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 289.67	\$ 3,476.09	51.7%
City of Camrose	\$ 15.93	1.1270						\$ 224.43	\$ 2,693.10	17.5%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 158.94	\$ 1,907.28	-16.8%
City of Edmonton	\$ 16.15	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 205.54	\$ 2,466.52	7.6%
City of Fort McMurray	\$ 99.74	0.9614	23	0.9846	45	1.0110	>46	\$ 285.05	\$ 3,420.64	49.2%
City of Fort Saskatchewan	\$ 18.50		12.5	1.0000	>12.5			\$ 191.00	\$ 2,292.00	0.0%
City of Grande Prairie	\$ 40.00	0.8150						\$ 190.78	\$ 2,289.30	-0.1%
City of Leduc	\$ 77.52	0.8633						\$ 237.23	\$ 2,846.77	24.2%
City of Lethbridge	\$ 42.91	0.7990	75	0.6180	675	0.4370	1,750	\$ 259.51	\$ 3,114.06	35.9%
City of Lloydminster	\$ 7.03		22.6	1.1660	113.6	0.9460	318	\$ 180.69	\$ 2,168.26	-5.4%
City of Medicine Hat	\$ 9.03	0.3622						\$ 76.04	\$ 912.44	-60.2%
Parkland County	\$ 25.00	1.1500						\$ 237.75	\$ 2,853.00	24.5%
City of Red Deer	\$ 159.01	0.3673						\$ 226.96	\$ 2,723.53	18.8%
City of St. Albert	\$ 14.22	0.6417						\$ 132.93	\$ 1,595.21	-30.4%
City of Spruce Grove	\$ 21.01	1.1400						\$ 231.91	\$ 2,782.92	21.4%
Strathcona County	\$ 4.85	0.6817						\$ 130.96	\$ 1,571.57	-31.4%
City of Wetaskiwin	\$ 39.40	0.8566	57	0.7211	>57			\$ 180.46	\$ 2,165.51	-5.5%
Average Monthly Use (m³)	185.0	2" meter								

NORTH WATER SYSTEM

INDUSTRIAL WATER SERVICE

	Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
		Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)			
City of Airdrie	\$ 878.40	-	10	0.4570	10+			\$ 3,158.83	\$ 37,905.96	-37.0%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 2,262.38	\$ 27,148.56	-54.9%
City of Camrose	\$ 15.93	1.1270						\$ 5,650.93	\$ 67,811.16	12.7%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 4,107.24	\$ 49,286.88	-18.1%
City of Edmonton	\$ 57.80	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 3,462.65	\$ 41,551.80	-31.0%
City of Fort McMurray	\$ 227.80	0.9614	23	0.9846	45	1.0110	>46	\$ 5,281.08	\$ 63,372.94	5.3%
City of Fort Saskatchewan	\$ 28.00		12.5	1.0000	>12.5			\$ 5,015.50	\$ 60,186.00	0.0%
City of Grande Prairie	\$ 157.50	0.8150						\$ 4,232.50	\$ 50,790.00	-15.6%
City of Leduc	\$ 310.99	0.8633						\$ 4,627.49	\$ 55,529.88	-7.7%
City of Lethbridge	\$ 124.77	0.4120						\$ 2,184.77	\$ 26,217.24	-56.4%
City of Lloydminster	\$ 13.15		9	1.3620	13.5	1.3356	18	\$ 6,679.26	\$ 80,151.08	33.2%
City of Medicine Hat	\$ 9.03	0.3622						\$ 1,820.03	\$ 21,840.36	-63.7%
Parkland County	\$ 25.00	1.1500						\$ 5,775.00	\$ 69,300.00	15.1%
City of Red Deer	\$ 568.34	0.3673						\$ 2,404.84	\$ 28,858.08	-52.1%
City of St. Albert	\$ 56.89	0.6417						\$ 3,265.39	\$ 39,184.68	-34.9%
City of Spruce Grove	\$ 431.64	1.1400						\$ 6,131.64	\$ 73,579.68	22.3%
Strathcona County	\$ 4.85	0.6817						\$ 3,413.35	\$ 40,960.20	-31.9%
City of Wetaskiwin	\$ 62.90	0.8566	57	0.7211	>57			\$ 3,676.06	\$ 44,112.67	-26.7%
Average Monthly Use (m³)	5,000.0	4" Meter								

NORTH WATER SYSTEM

Option 2 - Water Treatment, Blackfalds, Lacombe and Ponoka

Amortization Table

A simple amortization table covering 24 payment periods of a loan.

1) To use the table, simply change any of the values in the "Initial data" area of the worksheet.

2) To print the table, just choose "Print" from the "File" menu. The print area is already defined.

Initial Data

LOAN DATA		TABLE DATA	
Loan amount:	\$17,649,879	Table starts at date:	
Annual interest rate:	6.250%	or at payment number:	1
Term in years:	20		
Payments per year:	1		0.065423886
First payment due:	12/31/2002		

PERIODIC PAYMENT

Entered payment: *The table uses the calculated periodic payment amount unless you enter a value for "Entered payment".*

Calculated payment: \$1,570,173.27

CALCULATIONS

Use payment of: \$1,570,173.27

Beginning balance at payment 1: 17,649,878.96

1st payment in table: 1

Cumulative interest prior to payment 1: 0.00

Table

No.	Payment Date	Beginning Balance	Interest	Principal	Ending Balance	Cumulative Interest
1	12/31/2002	17,649,878.96	1,103,117.43	467,055.84	17,182,823.12	1,103,117.43
2	12/31/2003	17,182,823.12	1,073,926.44	496,246.83	16,686,576.29	2,177,043.88
3	12/31/2004	16,686,576.29	1,042,911.02	527,262.26	16,159,314.03	3,219,954.90
4	12/31/2005	16,159,314.03	1,009,957.13	560,216.15	15,599,097.88	4,229,912.02
5	12/31/2006	15,599,097.88	974,943.62	595,229.66	15,003,868.23	5,204,855.64
6	12/31/2007	15,003,868.23	937,741.76	632,431.51	14,371,436.72	6,142,597.41
7	12/31/2008	14,371,436.72	898,214.79	671,958.48	13,699,478.24	7,040,812.20
8	12/31/2009	13,699,478.24	856,217.39	713,955.88	12,985,522.35	7,897,029.59
9	12/31/2010	12,985,522.35	811,595.15	758,578.13	12,226,944.22	8,708,624.74
10	12/31/2011	12,226,944.22	764,184.01	805,989.26	11,420,954.96	9,472,808.75
11	12/31/2012	11,420,954.96	713,809.69	856,363.59	10,564,591.37	10,186,618.44
12	12/31/2013	10,564,591.37	660,286.96	909,886.31	9,654,705.06	10,846,905.40
13	12/31/2014	9,654,705.06	603,419.07	966,754.21	8,687,950.85	11,450,324.46
14	12/31/2015	8,687,950.85	542,996.93	1,027,176.35	7,660,774.50	11,993,321.39
15	12/31/2016	7,660,774.50	478,798.41	1,091,374.87	6,569,399.63	12,472,119.80
16	12/31/2017	6,569,399.63	410,587.48	1,159,585.80	5,409,813.84	12,882,707.28
17	12/31/2018	5,409,813.84	338,113.36	1,232,059.91	4,177,753.93	13,220,820.64
18	12/31/2019	4,177,753.93	261,109.62	1,309,063.65	2,868,690.27	13,481,930.26
19	12/31/2020	2,868,690.27	179,293.14	1,390,880.13	1,477,810.14	13,661,223.40
20	12/31/2021	1,477,810.14	92,363.13	1,477,810.14	0.00	13,753,586.54

NORTH WATER SYSTEM
Continuity Schedule of Fixed Assets

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Land & Land Rights</u>	<u>River Intake/ Low Lift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2001	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2002	0	0	0	0	0	0	0	0	0
Additions	2,243,196					19,856,211	1,082,047	327,025	23,508,479
Retirements									0
2003	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2004	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2005	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2006	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2007	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2008	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2009	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2010	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2011	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0
2012	2,243,196	0	0	0	0	19,856,211	1,082,047	327,025	23,508,479
Additions									0
Retirements									0

NORTH WATER SYSTEM
Continuity Schedule of Accumulated Depreciation

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>River Intake/ LowLift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2001	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2002	0	0	0	0	0	0	0	0
Additions	0	0	0	0	198,562	10,820	16,351	225,734
Retirements								0
2003	0	0	0	0	198,562	10,820	16,351	225,734
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2004	0	0	0	0	595,686	32,461	49,054	677,202
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2005	0	0	0	0	992,811	54,102	81,756	1,128,669
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2006	0	0	0	0	1,389,935	75,743	114,459	1,580,137
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2007	0	0	0	0	1,787,059	97,384	147,161	2,031,605
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2008	0	0	0	0	2,184,183	119,025	179,864	2,483,072
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2009	0	0	0	0	2,581,307	140,666	212,566	2,934,540
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2010	0	0	0	0	2,978,432	162,307	245,269	3,386,008
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2011	0	0	0	0	3,375,556	183,948	277,971	3,837,475
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
2012	0	0	0	0	3,772,680	205,589	310,674	4,288,943
Additions	0	0	0	0	397,124	21,641	32,703	451,468
Retirements								0
Useful Service Life	50	20	50	20	50	50	10	
Depreciation Rate	2.00%	5.00%	2.00%	5.00%	2.00%	2.00%	10.00%	

NORTH WATER SYSTEM
Continuity Schedule of No-Cost Capital

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions				0
Retirements				0
2001	0	0	0	0
Additions				0
Retirements				0
2002	0	0	0	0
Additions	5,385,858	10,242,819		15,628,677
Retirements				0
2003	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2004	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2005	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2006	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2007	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2008	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2009	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2010	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2011	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0
2012	5,385,858	10,242,819	0	15,628,677
Additions				0
Retirements				0

NORTH WATER SYSTEM
Continuity Schedule of Amortization of No-Cost Capital
Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Provincial <u>Grants</u>	INA <u>Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions	0	0	0	0
Retirements				0
2001	0	0	0	0
Additions	0	0	0	0
Retirements				0
2002	0	0	0	0
Additions	53,859	102,428	0	156,287
Retirements				0
2003	53,859	102,428	0	156,287
Additions	107,717	204,856	0	312,574
Retirements				0
2004	161,576	307,285	0	468,860
Additions	107,717	204,856	0	312,574
Retirements				0
2005	269,293	512,141	0	781,434
Additions	107,717	204,856	0	312,574
Retirements				0
2006	377,010	716,997	0	1,094,007
Additions	107,717	204,856	0	312,574
Retirements				0
2007	484,727	921,854	0	1,406,581
Additions	107,717	204,856	0	312,574
Retirements				0
2008	592,444	1,126,710	0	1,719,154
Additions	107,717	204,856	0	312,574
Retirements				0
2009	700,162	1,331,566	0	2,031,728
Additions	107,717	204,856	0	312,574
Retirements				0
2010	807,879	1,536,423	0	2,344,302
Additions	107,717	204,856	0	312,574
Retirements				0
2011	915,596	1,741,279	0	2,656,875
Additions	107,717	204,856	0	312,574
Retirements				0
2012	1,023,313	1,946,136	0	2,969,449
Additions	107,717	204,856	0	312,574
Retirements				0
Useful Service Life	50	50	50	
Amortization Rate	2.00%	2.00%	2.00%	

**NORTH WATER SYSTEM
Composite Cost of Debt**

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Debenture Number	Allocation to Water	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	100.00%	6.25%	-	7,671,284	7,449,735	7,214,338	6,964,229	6,698,488	6,416,139	6,116,142	5,797,396	5,458,729	5,098,894
Total Debenture Debt @ Year-End			-	7,671,284	7,449,735	7,214,338	6,964,229	6,698,488	6,416,139	6,116,142	5,797,396	5,458,729	5,098,894
Average Cost of Debt				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

Debenture Number	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	6.25%		3,835,642	7,560,510	7,332,036	7,089,284	6,831,359	6,557,314	6,266,141	5,956,769	5,628,062	5,278,811
Total Debenture Debt @ Mid-Year			3,835,642	7,560,510	7,332,036	7,089,284	6,831,359	6,557,314	6,266,141	5,956,769	5,628,062	5,278,811
Cost of Debt @ Mid-Year				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

NORTH WATER SYSTEM
Calculation of No-Cost Capital @ Mid-Year

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. No-Cost Capital (Contributions & Grants, Schedule "A-3")										
a) Opening Balance	-	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677
b) Additions	15,628,677	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677	15,628,677
2. Accumulated Amortization (Schedule "A-4")										
a) Opening Balance	-	156,287	468,860	781,434	1,094,007	1,406,581	1,719,154	2,031,728	2,344,302	2,656,875
b) Additions	156,287	312,574	312,574	312,574	312,574	312,574	312,574	312,574	312,574	312,574
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	156,287	468,860	781,434	1,094,007	1,406,581	1,719,154	2,031,728	2,344,302	2,656,875	2,969,449
3. Net No-Cost Capital										
a) Opening Balance (Line 1. a) - Line 2. a))	-	15,472,390	15,159,817	14,847,243	14,534,669	14,222,096	13,909,522	13,596,949	13,284,375	12,971,802
b) Closing Balance (Line 1. d) - Line 2. d))	15,472,390	15,159,817	14,847,243	14,534,669	14,222,096	13,909,522	13,596,949	13,284,375	12,971,802	12,659,228
c) Total	15,472,390	30,632,207	30,007,060	29,381,912	28,756,765	28,131,618	27,506,471	26,881,324	26,256,177	25,631,030
4. Net No-Cost Capital @ Mid-Year	<u>7,736,195</u>	<u>15,316,103</u>	<u>15,003,530</u>	<u>14,690,956</u>	<u>14,378,383</u>	<u>14,065,809</u>	<u>13,753,236</u>	<u>13,440,662</u>	<u>13,128,089</u>	<u>12,815,515</u>

NORTH WATER SYSTEM
Utility Rate Base

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. Gross Plant In Service (Schedule "A-1")										
a) Opening Balance	-	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479
b) Additions	23,508,479	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479	23,508,479
2. Accumulated Depreciation (Schedule "A-2")										
a) Opening Balance	-	225,734	677,202	1,128,669	1,580,137	2,031,605	2,483,072	2,934,540	3,386,008	3,837,475
b) Additions	225,734	451,468	451,468	451,468	451,468	451,468	451,468	451,468	451,468	451,468
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	225,734	677,202	1,128,669	1,580,137	2,031,605	2,483,072	2,934,540	3,386,008	3,837,475	4,288,943
3. Net Plant In Service										
a) Opening Balance (Line 1. a) - Line 2. a))	-	23,282,745	22,831,278	22,379,810	21,928,342	21,476,875	21,025,407	20,573,939	20,122,472	19,671,004
b) Closing Balance (Line 1. d) - Line 2. d))	23,282,745	22,831,278	22,379,810	21,928,342	21,476,875	21,025,407	20,573,939	20,122,472	19,671,004	19,219,536
c) Total	23,282,745	46,114,023	45,211,088	44,308,152	43,405,217	42,502,282	41,599,346	40,696,411	39,793,476	38,890,540
d) Mid Year Balance	11,641,373	23,057,012	22,605,544	22,154,076	21,702,609	21,251,141	20,799,673	20,348,206	19,896,738	19,445,270
4. Necessary Working Capital										
a) Cash Expenses incl. Water Purchases(Schedule "D")	21,581	44,241	45,347	46,481	47,643	48,834	50,055	51,306	52,589	53,903
b) One-Eighth of Cash Expenses	2,698	5,530	5,668	5,810	5,955	6,104	6,257	6,413	6,574	6,738
c) Prepaid Expenses	-	-	-	-	-	-	-	-	-	-
d) O&M Inventory	-	-	-	-	-	-	-	-	-	-
e) Necessary Working Capital (b+c+d)	2,698	5,530	5,668	5,810	5,955	6,104	6,257	6,413	6,574	6,738
5. Utility Rate Base @ Mid Year	<u>11,644,070</u>	<u>23,062,542</u>	<u>22,611,212</u>	<u>22,159,886</u>	<u>21,708,564</u>	<u>21,257,245</u>	<u>20,805,930</u>	<u>20,354,619</u>	<u>19,903,311</u>	<u>19,452,008</u>

NORTH WATER SYSTEM
Capitalization, Cost of Capital and Return
Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Year 1	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		3,835,642	32.94%	98.15%	3,835,642	6.25%	239,728
2. Equity		72,233	0.62%	1.85%	72,233	9.25%	6,682
3. Sub Total		3,907,875	33.56%	100.00%	3,907,875	6.31%	246,409
4. No-Cost Capital (Schedule "B-2")		7,736,195	66.44%		7,736,195	0.00%	-
5. Total		11,644,070	100.00%		11,644,070	2.12%	246,409
	Year 2	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,560,510	32.78%	97.60%	7,560,510	6.25%	472,532
2. Equity		185,929	0.81%	2.40%	185,929	9.25%	17,198
3. Sub Total		7,746,438	33.59%	100.00%	7,746,438	6.32%	489,730
4. No-Cost Capital (Schedule "B-2")		15,316,103	66.41%		15,316,103	0.00%	-
5. Total		23,062,542	100.00%		23,062,542	2.12%	489,730
	Year 3	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,332,036	32.43%	96.38%	7,332,036	6.25%	458,252
2. Equity		275,646	1.22%	3.62%	275,646	9.25%	25,497
3. Sub Total		7,607,683	33.65%	100.00%	7,607,683	6.36%	483,750
4. No-Cost Capital (Schedule "B-2")		15,003,530	66.35%		15,003,530	0.00%	-
5. Total		22,611,212	100.00%		22,611,212	2.14%	483,750
	Year 4	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		7,089,284	31.99%	94.92%	7,089,284	6.25%	443,080
2. Equity		379,647	1.71%	5.08%	379,647	9.25%	35,117
3. Sub Total		7,468,930	33.70%	100.00%	7,468,930	6.40%	478,198
4. No-Cost Capital (Schedule "B-2")		14,690,956	66.30%		14,690,956	0.00%	-
5. Total		22,159,886	100.00%		22,159,886	2.16%	478,198
	Year 5	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,831,359	31.47%	93.19%	6,831,359	6.25%	426,960
2. Equity		498,823	2.30%	6.81%	498,823	9.25%	46,141
3. Sub Total		7,330,181	33.77%	100.00%	7,330,181	6.45%	473,101
4. No-Cost Capital (Schedule "B-2")		14,378,383	66.23%		14,378,383	0.00%	-
5. Total		21,708,564	100.00%		21,708,564	2.18%	473,101
	Year 6	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,557,314	30.85%	91.18%	6,557,314	6.25%	409,832
2. Equity		634,122	2.98%	8.82%	634,122	9.25%	58,656
3. Sub Total		7,191,436	33.83%	100.00%	7,191,436	6.51%	468,488
4. No-Cost Capital (Schedule "B-2")		14,065,809	66.17%		14,065,809	0.00%	-
5. Total		21,257,245	100.00%		21,257,245	2.20%	468,488
	Year 7	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		6,266,141	30.12%	88.85%	6,266,141	6.25%	391,634
2. Equity		786,554	3.78%	11.15%	786,554	9.25%	72,756
3. Sub Total		7,052,694	33.90%	100.00%	7,052,694	6.58%	464,390
4. No-Cost Capital (Schedule "B-2")		13,753,236	66.10%		13,753,236	0.00%	-
5. Total		20,805,930	100.00%		20,805,930	2.23%	464,390
	Year 8	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,956,769	29.26%	86.16%	5,956,769	6.25%	372,298
2. Equity		957,187	4.70%	13.84%	957,187	9.25%	88,540
3. Sub Total		6,913,957	33.97%	100.00%	6,913,957	6.67%	460,838
4. No-Cost Capital (Schedule "B-2")		13,440,662	66.03%		13,440,662	0.00%	-
5. Total		20,354,619	100.00%		20,354,619	2.26%	460,838
	Year 9	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,628,062	28.28%	83.07%	5,628,062	6.25%	351,754
2. Equity		1,147,161	5.76%	16.93%	1,147,161	9.25%	106,112
3. Sub Total		6,775,223	34.04%	100.00%	6,775,223	6.76%	457,866
4. No-Cost Capital (Schedule "B-2")		13,128,089	65.96%		13,128,089	0.00%	-
5. Total		19,903,311	100.00%		19,903,311	2.30%	457,866
	Year 10	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1. Long Term Debt (Schedule "B-1")		5,278,811	27.14%	79.54%	5,278,811	6.25%	329,926
2. Equity		1,357,682	6.98%	20.46%	1,357,682	9.25%	125,586
3. Sub Total		6,636,493	34.12%	100.00%	6,636,493	6.86%	455,511
4. No-Cost Capital (Schedule "B-2")		12,815,515	65.88%		12,815,515	0.00%	-
5. Total		19,452,008	100.00%		19,452,008	2.34%	455,511

Schedule "B"

NORTH WATER SYSTEM
Cash Operating Expenses

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Account Code	Year 1 (Note 1)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Maintenance	28,162	28,866	29,588	30,327	31,086	31,863	32,659	33,476	34,313	35,170
Operators	15,000	15,375	15,759	16,153	16,557	16,971	17,395	17,830	18,276	18,733
Power	-	-	-	-	-	-	-	-	-	-
Heating	-	-	-	-	-	-	-	-	-	-
Chemicals	-	-	-	-	-	-	-	-	-	-
Totals	21,581	44,241	45,347	46,481	47,643	48,834	50,055	51,306	52,589	53,903

Note 1: Total is half year's expenses

NORTH WATER SYSTEM
Utility Revenue Requirement, Revenue by Source

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Year 1 (Notes 1, 2)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1. Water Purchases (Note 3)	1,042,960	2,365,744	2,645,567	2,757,045	2,868,523	2,980,001	3,091,479	3,202,957	3,342,176	3,481,396
2. Net Cash Operating Expenses (Schedule "D")	21,581	44,241	45,347	46,481	47,643	48,834	50,055	51,306	52,589	53,903
3. Non-Cash Expenses										
a) Depreciation (Schedule "A-2)	225,734	451,468	451,468	451,468	451,468	451,468	451,468	451,468	451,468	451,468
b) Amortization of NCC (Schedule "A-4)	(156,287)	(312,574)	(312,574)	(312,574)	(312,574)	(312,574)	(312,574)	(312,574)	(312,574)	(312,574)
c) Total	69,447	138,894	138,894	138,894	138,894	138,894	138,894	138,894	138,894	138,894
4. Return (Schedule "B")	246,409	489,730	483,750	478,198	473,101	468,488	464,390	460,838	457,866	455,511
5. Gross Revenue Requirement	<u>1,380,397</u>	<u>3,038,609</u>	<u>3,313,558</u>	<u>3,420,618</u>	<u>3,528,161</u>	<u>3,636,218</u>	<u>3,744,818</u>	<u>3,853,995</u>	<u>3,991,525</u>	<u>4,129,705</u>
6. Total Water Consumption (m ³ /year)	1,829,755	4,150,428	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	5,619,223	5,863,467	6,107,712
7. Average Wholesale Cost of Water (\$/m ³)	<u>0.754</u>	<u>0.732</u>	<u>0.714</u>	<u>0.707</u>	<u>0.701</u>	<u>0.696</u>	<u>0.690</u>	<u>0.686</u>	<u>0.681</u>	<u>0.676</u>

Notes:

1. Year 1 is assumed to be 2002
2. Assuming Operation mid-year, July 1 of year 1
2. Assume rate of \$0.57/m³ from City of Red Deer

NORTH WATER SYSTEM

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Present - 2001			Estimated 2002 Consumption M³ / Year	Estimated 2003 Consumption M³ / Year	Future - 2004			Estimated 2005 Consumption M³ / Year	Estimated 2006 Consumption M³ / Year	Estimated 2007 Consumption M³ / Year	Estimated 2008 Consumption M³ / Year	5 Year Future - 2009			Estimated 2010 Consumption M³ / Year	Estimated 2011 Consumption M³ / Year	Estimated 2012 Consumption M³ / Year	Estimated 2013 Consumption M³ / Year	10 Year Future - 2014			20 Year Future - 2024			50 Year Future - 2054		
	Population	Consumption Litre/Sec	M³ / Year			Population	Consumption Litre/Sec	M³ / Year					Population	Consumption Litre/Sec	M³ / Year					Population	Consumption Litre/Sec	M³ / Year	Population	Consumption Litre/Sec	M³ / Year	Population	Consumption Litre/Sec	M³ / Year
Blackfalds	3,300	14.1	445,665	490,682	535,698	4,300	18.4	580,715	595,018	609,322	623,625	637,929	4,830	20.7	652,232	668,297	684,362	700,427	716,492	5,424	23.2	732,557	6,843	29.3	924,102	13,736	58.8	1,855,049
Lacombe																												
Urban	9,232	39.5	1,246,782	1,381,832	1,516,882	12,232	52.4	1,651,932					14,180	60.7	1,915,041					15,502	66.4	2,093,532	17,991	77.0	2,429,629	28,121	120.4	3,797,705
Industrial			-				15.0	473,040						20.0	630,720						40.0	1,261,440		40.0	1,261,440		40.0	1,261,440
Total Lacombe	9,232	39.5	1,246,782	1,539,512	1,832,242	12,232	67.4	2,124,972	2,209,130	2,293,288	2,377,446	2,461,604	14,180	80.7	2,545,761	2,707,604	2,869,446	3,031,288	3,193,130	15,502	106.4	3,354,972	17,991	117.0	3,691,069	28,121	160.4	5,059,145
Ponoka	6,703	28.7	905,240	919,023	932,807	7,009	30.0	946,590	961,221	975,853	990,484	1,005,115	7,551	32.3	1,019,746	1,035,508	1,051,270	1,067,032	1,082,794	8,134	34.8	1,098,556	9,440	40.4	1,274,920	14,756	63.2	1,992,802
Other Industrial/ Residential Uses *				121,743	243,485		11.6	365,228	376,537	387,846	399,155	410,465		13.4	421,774	441,141	460,508	479,875	499,242		16.4	518,609		18.7	589,009		28.2	890,700
Subtotal - Towns Only				3,070,959	3,544,232			4,017,504	4,141,906	4,266,308	4,390,710	4,515,112			4,639,514	4,852,550	5,065,586	5,278,622	5,491,658									
Hobbema																												
Montana - Urban	102	0.4	13,775	14,201	14,627	111	0.5	15,052	15,532	16,011	16,491	16,970	129	0.6	17,450	18,006	18,562	19,117	19,673	150	0.6	20,229	201	0.9	27,186	489	2.1	65,988
Montana - Rural	462	0.5	15,177	15,646	16,115	505	0.5	16,584	20,957	25,331	29,704	34,077	585	1.2	38,451	39,676	40,900	42,125	43,350	678	1.4	44,575	912	1.9	59,905	2,213	4.6	145,405
Samson - Urban	1,453	6.2	196,228	202,293	208,358	1,588	6.8	214,423	221,254	228,084	234,914	241,745	1,841	7.9	248,575	256,494	264,412	272,330	280,249	2,134	9.1	288,167	2,868	12.3	387,272	6,960	29.8	940,011
Samson - Rural	3,392	3.5	111,427	114,871	118,315	3,707	3.9	121,760	153,869	185,978	218,087	250,196	4,297	9.0	282,305	291,298	300,291	309,284	318,276	4,981	10.4	327,269	6,694	13.9	439,822	16,249	33.9	1,067,564
Ermineskin - Urban	500	2.1	67,525	69,612	71,699	546	2.3	73,786	76,137	78,487	80,838	83,188	633	2.7	85,539	88,263	90,988	93,713	96,438	734	3.1	99,163	987	4.2	133,266	2,395	10.3	323,473
Ermineskin - Rural	1,782	1.9	58,539	60,348	62,157	1,947	2.0	63,967	80,835	97,704	114,573	131,441	2,257	4.7	148,310	153,035	157,759	162,483	167,208	2,617	5.5	171,932	3,517	7.3	231,062	8,537	17.8	560,849
Louis Bull - Urban	673	2.9	90,889	93,698	96,507	735	3.1	99,316	102,480	105,644	108,808	111,971	353	3.7	115,135	118,803	122,470	126,138	129,805	988	4.2	133,473	1,328	5.7	179,377	3,224	13.8	435,394
Louis Bull - Rural	528	0.6	17,345	17,881	18,417	577	0.6	18,953	23,951	28,949	33,948	38,946	669	1.4	43,944	45,344	46,743	48,143	49,543	775	1.6	50,943	1,042	2.2	68,463	2,529	5.3	166,177
Total Hobbema	8,892	18.1	570,904	588,550	606,196	9,717	19.8	623,842	695,015	766,189	837,362	908,535	11,264	31.1	979,709	1,010,917	1,042,126	1,073,334	1,104,543	13,058	36.0	1,135,751	17,549	48.4	1,526,354	42,596	117.5	3,704,863
Total	28,127	100.5	3,168,591	3,659,509	4,150,428	33,258	147.2	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	37,825	178.2	5,619,223	5,863,467	6,107,712	6,351,956	6,596,201	42,119	216.9	6,840,445	51,823	253.9	8,005,454	99,209	428.2	13,502,558

Assumptions

Urban Consumption based on 370 litres per person per day
Rural Consumption based on 180 litres per person per day
* at 10% of urban consumption of Blackfalds, Lacombe and Ponoka

NORTH WATER SYSTEM
Population

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Population Projections

2001 - 2054

Present	1				5				10																20	
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025		
3,300	3,600	3,900	4,300	4,401	4,504	4,610	4,719	4,830	4,943	5,059	5,178	5,300	5,424	5,552	5,682	5,816	5,952	6,092	6,236	6,382	6,532	6,686	6,843	7,003		
9,232	9,600	10,800	12,232	12,599	12,977	13,366	13,767	14,180	14,606	14,825	15,047	15,273	15,502	15,734	15,970	16,210	16,453	16,700	16,950	17,205	17,463	17,725	17,991	18,260		
6,703	6,804	6,906	7,009	7,114	7,221	7,329	7,439	7,551	7,664	7,779	7,896	8,014	8,134	8,256	8,380	8,506	8,634	8,763	8,895	9,028	9,163	9,301	9,440	9,582		
102	105	108	111	115	118	122	125	129	133	137	141	145	150	154	159	164	169	174	179	184	190	195	201	207		
462	476	490	505	520	536	552	568	585	603	621	640	659	678	699	720	741	764	787	810	834	859	885	912	939		
1,453	1,497	1,541	1,588	1,635	1,684	1,735	1,787	1,841	1,896	1,953	2,011	2,072	2,134	2,198	2,264	2,332	2,402	2,474	2,548	2,624	2,703	2,784	2,868	2,954		
3,392	3,494	3,599	3,707	3,818	3,932	4,050	4,172	4,297	4,426	4,559	4,695	4,836	4,981	5,131	5,285	5,443	5,606	5,775	5,948	6,126	6,310	6,499	6,694	6,895		
500	515	530	546	563	580	597	615	633	652	672	692	713	734	756	779	802	826	851	877	903	930	958	987	1,016		
1,782	1,835	1,891	1,947	2,006	2,066	2,128	2,192	225700%	2,325	2,395	2,467	2,541	2,617	2,695	2,776	2,860	2,945	3,034	3,125	3,218	3,315	3,414	3,517	3,622		
673	693	714	735	757	780	804	828	853	878	904	932	960	988	1,018	1,049	1,080	1,112	1,146	1,180	1,216	1,252	1,290	1,328	1,368		
528	544	560	577	594	612	630	649	669	689	710	731	753	775	799	823	847	873	899	926	954	982	1,012	1,042	1,073		
8,892	9,159	9,434	9,717	10,008	10,308	10,618	10,936	11,264	11,602	11,950	12,309	12,678	13,058	13,450	13,853	14,269	14,697	15,138	15,592	16,060	16,542	17,038	17,549	18,076		
28,127	29,162	31,039	33,258	34,122	35,011	35,923	36,861	37,825	38,815	39,613	40,430	41,265	42,119	42,993	43,886	44,801	45,736	46,693	47,673	48,675	49,700	50,749	51,823	52,921		

Assumptions

Blackfalds - Add a further 1,000 in 3 years and then 2.35% annual increase thereafter

Lacombe - Add further 3,000 in 3 years due to Meridian/Industrial Growth, 3% annual increase until 2010 and 1.5% annual increase thereafter

Ponoka - 1.5% annual increase

Hobbema - 3.0% annual increase

November																										
December (est)		16,614	68,346	518	43,288	144,435	3,899																			
Yearly Totals		16,614	68,346	518	43,288	144,435	3,899	0	277,100																	

NORTH WATER SYSTEM
Population

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

2026	2027	2028	2029	2030	2031	2032	2033	30 2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	40 2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	50 2054
7,168	7,337	7,509	7,685	7,866	8,051	8,240	8,434	8,632	8,835	9,042	9,255	9,472	9,695	9,923	10,156	10,395	10,639	10,889	11,145	11,407	11,675	11,949	12,230	12,517	12,811	13,112	13,421	13,736
18,534	18,812	19,095	19,381	19,672	19,967	20,266	20,570	20,879	21,192	21,510	21,833	22,160	22,492	22,830	23,172	23,520	23,873	24,231	24,594	24,963	25,338	25,718	26,103	26,495	26,892	27,296	27,705	28,121
9,726	9,872	10,020	10,170	10,322	10,477	10,634	10,794	10,956	11,120	11,287	11,456	11,628	11,803	11,980	12,159	12,342	12,527	12,715	12,906	13,099	13,296	13,495	13,697	13,903	14,111	14,323	14,538	14,756
214	220	227	233	240	248	255	263	271	279	287	296	304	314	323	333	343	353	364	374	386	397	409	421	434	447	461	474	489
967	996	1,026	1,057	1,089	1,121	1,155	1,190	1,225	1,262	1,300	1,339	1,379	1,421	1,463	1,507	1,552	1,599	1,647	1,696	1,747	1,800	1,853	1,909	1,966	2,025	2,086	2,149	2,213
3,042	3,134	3,228	3,324	3,424	3,527	3,633	3,742	3,854	3,969	4,089	4,211	4,338	4,468	4,602	4,740	4,882	5,028	5,179	5,335	5,495	5,659	5,829	6,004	6,184	6,370	6,561	6,758	6,960
7,102	7,315	7,535	7,761	7,993	8,233	8,480	8,735	8,997	9,267	9,545	9,831	10,126	10,430	10,743	11,065	11,397	11,739	12,091	12,454	12,827	13,212	13,608	14,017	14,437	14,870	15,316	15,776	16,249
1,047	1,078	1,111	1,144	1,178	1,214	1,250	1,288	1,326	1,366	1,407	1,449	1,493	1,537	1,584	1,631	1,680	1,730	1,782	1,836	1,891	1,948	2,006	2,066	2,128	2,192	2,258	2,325	2,395
3,731	3,843	3,958	4,077	4,199	4,325	4,455	4,589	4,726	4,868	5,014	5,165	5,320	5,479	5,644	5,813	5,987	6,167	6,352	6,543	6,739	6,941	7,149	7,364	7,585	7,812	8,046	8,288	8,537
1,409	1,451	1,495	1,540	1,586	1,634	1,683	1,733	1,785	1,839	1,894	1,951	2,009	2,069	2,131	2,195	2,261	2,329	2,399	2,471	2,545	2,621	2,700	2,781	2,864	2,950	3,039	3,130	3,224
1,106	1,139	1,173	1,208	1,244	1,282	1,320	1,360	1,400	1,442	1,486	1,530	1,576	1,623	1,672	1,722	1,774	1,827	1,882	1,939	1,997	2,057	2,118	2,182	2,247	2,315	2,384	2,456	2,529
18,618	19,176	19,752	20,344	20,955	21,583	22,231	22,898	23,585	24,292	25,021	25,771	26,545	27,341	28,161	29,006	29,876	30,773	31,696	32,647	33,626	34,635	35,674	36,744	37,846	38,982	40,151	41,356	42,596
54,046	55,197	56,375	57,581	58,815	60,078	61,371	62,696	64,051	65,439	66,860	68,315	69,805	71,331	72,893	74,494	76,132	77,811	79,530	81,291	83,095	84,943	86,835	88,775	90,761	92,797	94,882	97,019	99,209

NORTH WATER SYSTEM

RESIDENTIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service Charge	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Monthly Bill	Cost	Cost
City of Airdrie	\$ 30.52	-	10	0.4570	10+			\$ 37.38	\$ 448.50	35.9%
City of Calgary	\$ 8.68	0.7882		-		-		\$ 28.39	\$ 340.62	3.2%
City of Camrose	\$ 15.93	1.1270						\$ 44.11	\$ 529.26	60.4%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 27.74	\$ 332.88	0.9%
City of Edmonton	\$ 3.55	0.9422	60	1.0073	>60			\$ 27.11	\$ 325.26	-1.4%
City of Fort Saskatchewan	\$ 12.50		10	1.0000	11+			\$ 27.50	\$ 330.00	0.0%
City of Fort McMurray	\$ 13.07	0.7657	23	1.0188	45	1.0457	46+	\$ 32.72	\$ 392.62	19.0%
City of Grande Prairie	\$ 5.00	0.8140						\$ 25.35	\$ 304.20	-7.8%
City of Leduc	\$ 7.45	0.8436						\$ 28.54	\$ 342.48	3.8%
City of Lethbridge	\$ 16.78	0.4120						\$ 27.08	\$ 324.96	-1.5%
City of Lloydminster	\$ 11.80		9.1	1.2254	4.5	1.1990	4.5	\$ 31.30	\$ 375.54	13.8%
City of Medicine Hat	\$ 7.03	0.3622						\$ 16.09	\$ 193.02	-41.5%
Parkland County	\$ 25.00	1.1500						\$ 25.00	\$ 300.00	-9.1%
City of Red Deer	\$ 9.68	0.3672						\$ 18.86	\$ 226.32	-31.4%
City of St. Albert	\$ 2.00	0.6417						\$ 18.04	\$ 216.51	-34.4%
City of Spruce Grove	* \$ 4.01	1.1400	(for water service only - \$1.5740 for W&S)					\$ 21.11	\$ 253.32	-23.2%
Strathcona County	\$ 5.36	0.8000						\$ 25.36	\$ 304.32	-7.8%
City of Wetaskiwin	\$ 9.80	0.8600	57	0.7211	>57			\$ 31.30	\$ 375.60	13.8%
Average Monthly Use (m ³)	25.0	5/8" meter								

* Combined water/sewer: 60% to water

NORTH WATER SYSTEM

COMMERCIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Monthly Bill	Cost	Cost
	Charge	(\$/m3)	(m3)	(\$/m3)	(m3)	(\$/m3)	(m3)			
City of Airdrie	\$ 225.22	-	10	0.4570	10+			\$ 305.20	\$ 3,662.34	59.8%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 289.67	\$ 3,476.09	51.7%
City of Camrose	\$ 15.93	1.1270						\$ 224.43	\$ 2,693.10	17.5%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 158.94	\$ 1,907.28	-16.8%
City of Edmonton	\$ 16.15	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 205.54	\$ 2,466.52	7.6%
City of Fort McMurray	\$ 99.74	0.9614	23	0.9846	45	1.0110	>46	\$ 285.05	\$ 3,420.64	49.2%
City of Fort Saskatchewan	\$ 18.50		12.5	1.0000	>12.5			\$ 191.00	\$ 2,292.00	0.0%
City of Grande Prairie	\$ 40.00	0.8150						\$ 190.78	\$ 2,289.30	-0.1%
City of Leduc	\$ 77.52	0.8633						\$ 237.23	\$ 2,846.77	24.2%
City of Lethbridge	\$ 42.91	0.7990	75	0.6180	675	0.4370	1,750	\$ 259.51	\$ 3,114.06	35.9%
City of Lloydminster	\$ 7.03		22.6	1.1660	113.6	0.9460	318	\$ 180.69	\$ 2,168.26	-5.4%
City of Medicine Hat	\$ 9.03	0.3622						\$ 76.04	\$ 912.44	-60.2%
Parkland County	\$ 25.00	1.1500						\$ 237.75	\$ 2,853.00	24.5%
City of Red Deer	\$ 159.01	0.3673						\$ 226.96	\$ 2,723.53	18.8%
City of St. Albert	\$ 14.22	0.6417						\$ 132.93	\$ 1,595.21	-30.4%
City of Spruce Grove	\$ 21.01	1.1400						\$ 231.91	\$ 2,782.92	21.4%
Strathcona County	\$ 4.85	0.6817						\$ 130.96	\$ 1,571.57	-31.4%
City of Wetaskiwin	\$ 39.40	0.8566	57	0.7211	>57			\$ 180.46	\$ 2,165.51	-5.5%
Average Monthly Use (m³)	185.0	2" meter								

NORTH WATER SYSTEM

INDUSTRIAL WATER SERVICE

	Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
		Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)	Unit Rate (\$/m3)	Max. Vol. (m3)			
City of Airdrie	\$ 878.40	-	10	0.4570	10+			\$ 3,158.83	\$ 37,905.96	-37.0%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 2,262.38	\$ 27,148.56	-54.9%
City of Camrose	\$ 15.93	1.1270						\$ 5,650.93	\$ 67,811.16	12.7%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 4,107.24	\$ 49,286.88	-18.1%
City of Edmonton	\$ 57.80	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 3,462.65	\$ 41,551.80	-31.0%
City of Fort McMurray	\$ 227.80	0.9614	23	0.9846	45	1.0110	>46	\$ 5,281.08	\$ 63,372.94	5.3%
City of Fort Saskatchewan	\$ 28.00		12.5	1.0000	>12.5			\$ 5,015.50	\$ 60,186.00	0.0%
City of Grande Prairie	\$ 157.50	0.8150						\$ 4,232.50	\$ 50,790.00	-15.6%
City of Leduc	\$ 310.99	0.8633						\$ 4,627.49	\$ 55,529.88	-7.7%
City of Lethbridge	\$ 124.77	0.4120						\$ 2,184.77	\$ 26,217.24	-56.4%
City of Lloydminster	\$ 13.15		9	1.3620	13.5	1.3356	18	\$ 6,679.26	\$ 80,151.08	33.2%
City of Medicine Hat	\$ 9.03	0.3622						\$ 1,820.03	\$ 21,840.36	-63.7%
Parkland County	\$ 25.00	1.1500						\$ 5,775.00	\$ 69,300.00	15.1%
City of Red Deer	\$ 568.34	0.3673						\$ 2,404.84	\$ 28,858.08	-52.1%
City of St. Albert	\$ 56.89	0.6417						\$ 3,265.39	\$ 39,184.68	-34.9%
City of Spruce Grove	\$ 431.64	1.1400						\$ 6,131.64	\$ 73,579.68	22.3%
Strathcona County	\$ 4.85	0.6817						\$ 3,413.35	\$ 40,960.20	-31.9%
City of Wetaskiwin	\$ 62.90	0.8566	57	0.7211	>57			\$ 3,676.06	\$ 44,112.67	-26.7%
Average Monthly Use (m ³)	5,000.0	4" Meter								

NORTH WATER SYSTEM

Option 3 - Purchase Water, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Amortization Table

A simple amortization table covering 24 payment periods of a loan.

1) To use the table, simply change any of the values in the "Initial data" area of the worksheet.

2) To print the table, just choose "Print" from the "File" menu. The print area is already defined.

Initial Data

LOAN DATA

Loan amount: \$7,879,802
Annual interest rate: 6.250%
Term in years: 20
Payments per year: 1
First payment due: 12/31/2002

TABLE DATA

Table starts at date:
or at payment number: 1

0.029208544

PERIODIC PAYMENT

Entered payment:
Calculated payment: \$701,005.05

The table uses the calculated periodic payment amount unless you enter a value for "Entered payment".

CALCULATIONS

Use payment of: \$701,005.05
1st payment in table: 1

Beginning balance at payment 1: 7,879,801.85
Cumulative interest prior to payment 1: 0.00

Table

No.	Payment Date	Beginning Balance	Interest	Principal	Ending Balance	Cumulative Interest
1	12/31/2002	7,879,801.85	492,487.62	208,517.43	7,671,284.42	492,487.62
2	12/31/2003	7,671,284.42	479,455.28	221,549.77	7,449,734.65	971,942.89
3	12/31/2004	7,449,734.65	465,608.42	235,396.63	7,214,338.01	1,437,551.31
4	12/31/2005	7,214,338.01	450,896.13	250,108.92	6,964,229.09	1,888,447.43
5	12/31/2006	6,964,229.09	435,264.32	265,740.73	6,698,488.36	2,323,711.75
6	12/31/2007	6,698,488.36	418,655.52	282,349.53	6,416,138.83	2,742,367.27
7	12/31/2008	6,416,138.83	401,008.68	299,996.37	6,116,142.45	3,143,375.95
8	12/31/2009	6,116,142.45	382,258.90	318,746.15	5,797,396.31	3,525,634.85
9	12/31/2010	5,797,396.31	362,337.27	338,667.78	5,458,728.53	3,887,972.12
10	12/31/2011	5,458,728.53	341,170.53	359,834.52	5,098,894.01	4,229,142.66
11	12/31/2012	5,098,894.01	318,680.88	382,324.17	4,716,569.84	4,547,823.53
12	12/31/2013	4,716,569.84	294,785.61	406,219.44	4,310,350.40	4,842,609.15
13	12/31/2014	4,310,350.40	269,396.90	431,608.15	3,878,742.25	5,112,006.05
14	12/31/2015	3,878,742.25	242,421.39	458,583.66	3,420,158.59	5,354,427.44
15	12/31/2016	3,420,158.59	213,759.91	487,245.14	2,932,913.45	5,568,187.35
16	12/31/2017	2,932,913.45	183,307.09	517,697.96	2,415,215.49	5,751,494.44
17	12/31/2018	2,415,215.49	150,950.97	550,054.08	1,865,161.41	5,902,445.41
18	12/31/2019	1,865,161.41	116,572.59	584,432.46	1,280,728.95	6,019,018.00
19	12/31/2020	1,280,728.95	80,045.56	620,959.49	659,769.46	6,099,063.56
20	12/31/2021	659,769.46	41,235.59	659,769.46	0.00	6,140,299.15

Table 1 - Rates for first three years of operation under each option

Table 2 - 10 year projection of rates

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³	\$/m ³
Option 1 - Base Case	0.788	0.758	0.734	0.728	0.723	0.717	0.713	0.708	0.702	0.696
Option 2 - Water Treatment Plant	0.813	0.726	0.657	0.641	0.626	0.612	0.600	0.589	0.572	0.558
Option 3 - Base Case + First Nations	0.754	0.732	0.714	0.707	0.701	0.696	0.690	0.686	0.681	0.676
Option 4 - Water Treatment Plant + First Nations	0.693	0.627	0.572	0.552	0.534	0.518	0.504	0.492	0.478	0.466

NORTH WATER SYSTEM
Utility Rate Base

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1. Gross Plant In Service (Schedule "A-1")										
a) Opening Balance	-	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520
b) Additions	43,508,520	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520	43,508,520
2. Accumulated Depreciation (Schedule "A-2")										
a) Opening Balance	-	555,307	1,665,920	2,776,534	3,887,148	4,997,761	6,108,375	7,218,988	8,329,602	9,440,216
b) Additions	555,307	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	555,307	1,665,920	2,776,534	3,887,148	4,997,761	6,108,375	7,218,988	8,329,602	9,440,216	10,550,829
3. Net Plant In Service										
a) Opening Balance (Line 1. a) - Line 2. a))	-	42,953,213	41,842,599	40,731,986	39,621,372	38,510,759	37,400,145	36,289,531	35,178,918	34,068,304
b) Closing Balance (Line 1. d) - Line 2. d))	42,953,213	41,842,599	40,731,986	39,621,372	38,510,759	37,400,145	36,289,531	35,178,918	34,068,304	32,957,691
c) Total	42,953,213	84,795,812	82,574,585	80,353,358	78,132,131	75,910,903	73,689,676	71,468,449	69,247,222	67,025,995
d) Mid Year Balance	21,476,606	42,397,906	41,287,293	40,176,679	39,066,065	37,955,452	36,844,838	35,734,225	34,623,611	33,512,997
4. Necessary Working Capital										
a) Cash Expenses incl. Water Purchases(Schedule "D")	422,008	930,388	1,020,552	1,073,386	1,128,224	1,185,133	1,244,182	1,305,443	1,376,682	1,450,666
b) One-Eighth of Cash Expenses	52,751	116,299	127,569	134,173	141,028	148,142	155,523	163,180	172,085	181,333
c) Prepaid Expenses	-	-	-	-	-	-	-	-	-	-
d) O&M Inventory	-	-	-	-	-	-	-	-	-	-
e) Necessary Working Capital (b+c+d)	52,751	116,299	127,569	134,173	141,028	148,142	155,523	163,180	172,085	181,333
5. Utility Rate Base @ Mid Year	<u>21,529,357</u>	<u>42,514,205</u>	<u>41,414,862</u>	<u>40,310,852</u>	<u>39,207,093</u>	<u>38,103,593</u>	<u>37,000,361</u>	<u>35,897,405</u>	<u>34,795,696</u>	<u>33,694,331</u>

NORTH WATER SYSTEM
Continuity Schedule of Fixed Assets

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Land & Land Rights</u>	<u>River Intake/ Low Lift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2001	0	0	0	0	0	0	0	0	0
Additions									0
Retirements									0
2002	0	0	0	0	0	0	0	0	0
Additions	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Retirements									0
2003	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2004	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2005	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2006	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2007	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2008	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2009	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2010	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2011	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0
2012	3,123,346	1,770,313	1,770,313	7,454,625	7,454,625	20,526,226	1,082,047	327,025	43,508,520
Additions									0
Retirements									0

NORTH WATER SYSTEM
Continuity Schedule of Accumulated Depreciation

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>River Intake/ Low Lift Station</u>	<u>Low Lift Pumps</u>	<u>Water Treatment Plant</u>	<u>High Lift Pump Station</u>	<u>Pipeline</u>	<u>Lateral Connections</u>	<u>SCADA System</u>	<u>Total</u>
2000	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2001	0	0	0	0	0	0	0	0
Additions	0	0	0	0	0	0	0	0
Retirements								0
2002	0	0	0	0	0	0	0	0
Additions	17,703	44,258	74,546	186,366	205,262	10,820	16,351	555,307
Retirements								0
2003	17,703	44,258	74,546	186,366	205,262	10,820	16,351	555,307
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2004	53,109	132,773	223,639	559,097	615,787	32,461	49,054	1,665,920
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2005	88,516	221,289	372,731	931,828	1,026,311	54,102	81,756	2,776,534
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2006	123,922	309,805	521,824	1,304,559	1,436,836	75,743	114,459	3,887,148
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2007	159,328	398,320	670,916	1,677,291	1,847,360	97,384	147,161	4,997,761
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2008	194,734	486,836	820,009	2,050,022	2,257,885	119,025	179,864	6,108,375
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2009	230,141	575,352	969,101	2,422,753	2,668,409	140,666	212,566	7,218,988
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2010	265,547	663,867	1,118,194	2,795,484	3,078,934	162,307	245,269	8,329,602
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2011	300,953	752,383	1,267,286	3,168,216	3,489,458	183,948	277,971	9,440,216
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
2012	336,359	840,898	1,416,379	3,540,947	3,899,983	205,589	310,674	10,550,829
Additions	35,406	88,516	149,093	372,731	410,525	21,641	32,703	1,110,614
Retirements								0
Useful Service Life	50	20	50	20	50	50	10	
Depreciation Rate	2.00%	5.00%	2.00%	5.00%	2.00%	2.00%	10.00%	

NORTH WATER SYSTEM
Continuity Schedule of No-Cost Capital

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions				0
Retirements				0
2001	0	0	0	0
Additions				0
Retirements				0
2002	0	0	0	0
Additions	12,063,722	13,794,919		25,858,641
Retirements				0
2003	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2004	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2005	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2006	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2007	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2008	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2009	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2010	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2011	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0
2012	12,063,722	13,794,919	0	25,858,641
Additions				0
Retirements				0

NORTH WATER SYSTEM
Continuity Schedule of Amortization of No-Cost Capital

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Provincial Grants</u>	<u>INA Contributions</u>	<u>Other</u>	<u>Total</u>
2000	0	0	0	0
Additions	0	0	0	0
Retirements				0
2001	0	0	0	0
Additions	0	0	0	0
Retirements				0
2002	0	0	0	0
Additions	120,637	137,949	0	258,586
Retirements				0
2003	120,637	137,949	0	258,586
Additions	241,274	275,898	0	517,173
Retirements				0
2004	361,912	413,848	0	775,759
Additions	241,274	275,898	0	517,173
Retirements				0
2005	603,186	689,746	0	1,292,932
Additions	241,274	275,898	0	517,173
Retirements				0
2006	844,461	965,644	0	1,810,105
Additions	241,274	275,898	0	517,173
Retirements				0
2007	1,085,735	1,241,543	0	2,327,278
Additions	241,274	275,898	0	517,173
Retirements				0
2008	1,327,009	1,517,441	0	2,844,451
Additions	241,274	275,898	0	517,173
Retirements				0
2009	1,568,284	1,793,339	0	3,361,623
Additions	241,274	275,898	0	517,173
Retirements				0
2010	1,809,558	2,069,238	0	3,878,796
Additions	241,274	275,898	0	517,173
Retirements				0
2011	2,050,833	2,345,136	0	4,395,969
Additions	241,274	275,898	0	517,173
Retirements				0
2012	2,292,107	2,621,035	0	4,913,142
Additions	241,274	275,898	0	517,173
Retirements				0
Useful Service Life	50	50	50	
Amortization Rate	2.00%	2.00%	2.00%	

NORTH WATER SYSTEM
Capitalization, Cost of Capital and Return
Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

		Year 1	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		8,591,412	39.91%	98.42%	8,591,412	6.25%	536,963
2.	Equity		137,919	0.64%	1.58%	137,919	9.25%	12,757
3.	Sub Total		8,729,330	40.55%	100.00%	8,729,330	6.30%	549,721
4.	No-Cost Capital (Schedule "B-2")		12,800,027	59.45%		12,800,027	0.00%	-
5.	Total		21,529,357	100.00%		21,529,357	2.55%	549,721
		Year 2	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		16,934,700	39.83%	98.61%	16,934,700	6.25%	1,058,419
2.	Equity		238,037	0.56%	1.39%	238,037	9.25%	22,018
3.	Sub Total		17,172,736	40.39%	100.00%	17,172,736	6.29%	1,080,437
4.	No-Cost Capital (Schedule "B-2")		25,341,468	59.61%		25,341,468	0.00%	-
5.	Total		42,514,205	100.00%		42,514,205	2.54%	1,080,437
		Year 3	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		16,422,945	39.65%	98.99%	16,422,945	6.25%	1,026,434
2.	Equity		167,621	0.40%	1.01%	167,621	9.25%	15,505
3.	Sub Total		16,590,566	40.06%	100.00%	16,590,566	6.28%	1,041,939
4.	No-Cost Capital (Schedule "B-2")		24,824,295	59.94%		24,824,295	0.00%	-
5.	Total		41,414,862	100.00%		41,414,862	2.52%	1,041,939
		Year 4	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		15,879,206	39.39%	99.22%	15,879,206	6.25%	992,450
2.	Equity		124,524	0.31%	0.78%	124,524	9.25%	11,518
3.	Sub Total		16,003,730	39.70%	100.00%	16,003,730	6.27%	1,003,969
4.	No-Cost Capital (Schedule "B-2")		24,307,123	60.30%		24,307,123	0.00%	-
5.	Total		40,310,852	100.00%		40,310,852	2.49%	1,003,969
		Year 5	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		15,301,483	39.03%	99.25%	15,301,483	6.25%	956,343
2.	Equity		115,661	0.29%	0.75%	115,661	9.25%	10,699
3.	Sub Total		15,417,144	39.32%	100.00%	15,417,144	6.27%	967,041
4.	No-Cost Capital (Schedule "B-2")		23,789,950	60.68%		23,789,950	0.00%	-
5.	Total		39,207,093	100.00%		39,207,093	2.47%	967,041
		Year 6	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		14,687,652	38.55%	99.03%	14,687,652	6.25%	917,978
2.	Equity		143,164	0.38%	0.97%	143,164	9.25%	13,243
3.	Sub Total		14,830,816	38.92%	100.00%	14,830,816	6.28%	931,221
4.	No-Cost Capital (Schedule "B-2")		23,272,777	61.08%		23,272,777	0.00%	-
5.	Total		38,103,593	100.00%		38,103,593	2.44%	931,221
		Year 7	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		14,035,457	37.93%	98.53%	14,035,457	6.25%	877,216
2.	Equity		209,299	0.57%	1.47%	209,299	9.25%	19,360
3.	Sub Total		14,244,757	38.50%	100.00%	14,244,757	6.29%	896,576
4.	No-Cost Capital (Schedule "B-2")		22,755,604	61.50%		22,755,604	0.00%	-
5.	Total		37,000,361	100.00%		37,000,361	2.42%	896,576
		Year 8	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		13,342,500	37.17%	97.68%	13,342,500	6.25%	833,906
2.	Equity		316,473	0.88%	2.32%	316,473	9.25%	29,274
3.	Sub Total		13,658,974	38.05%	100.00%	13,658,974	6.32%	863,180
4.	No-Cost Capital (Schedule "B-2")		22,238,431	61.95%		22,238,431	0.00%	-
5.	Total		35,897,405	100.00%		35,897,405	2.40%	863,180
		Year 9	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		12,606,233	36.23%	96.42%	12,606,233	6.25%	787,890
2.	Equity		468,204	1.35%	3.58%	468,204	9.25%	43,309
3.	Sub Total		13,074,438	37.57%	100.00%	13,074,438	6.36%	831,198
4.	No-Cost Capital (Schedule "B-2")		21,721,258	62.43%		21,721,258	0.00%	-
5.	Total		34,795,696	100.00%		34,795,696	2.39%	831,198
		Year 10	Mid-Year Capitalization	Capital Ratio Including NCC	Capital Ratio Excluding NCC	Rate Base	Cost Rate	Return
1.	Long Term Debt (Schedule "B-1")		11,823,950	35.09%	94.67%	11,823,950	6.25%	738,997
2.	Equity		666,295	1.98%	5.33%	666,295	9.25%	61,632
3.	Sub Total		12,490,245	37.07%	100.00%	12,490,245	6.41%	800,629
4.	No-Cost Capital (Schedule "B-2")		21,204,086	62.93%		21,204,086	0.00%	-
5.	Total		33,694,331	100.00%		33,694,331	2.38%	800,629

Schedule "B"

**NORTH WATER SYSTEM
Composite Cost of Debt**

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Debenture Number	Allocation to Water	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	100.00%	6.25%	-	17,182,823	16,686,576	16,159,314	15,599,098	15,003,868	14,371,437	13,699,478	12,985,522	12,226,944	11,420,955
Total Debenture Debt @ Year-End			-	17,182,823	16,686,576	16,159,314	15,599,098	15,003,868	14,371,437	13,699,478	12,985,522	12,226,944	11,420,955
Average Cost of Debt				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

Debenture Number	Effective Cost Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
AMFC	6.25%		8,591,412	16,934,700	16,422,945	15,879,206	15,301,483	14,687,652	14,035,457	13,342,500	12,606,233	11,823,950
Total Debenture Debt @ Mid-Year			8,591,412	16,934,700	16,422,945	15,879,206	15,301,483	14,687,652	14,035,457	13,342,500	12,606,233	11,823,950
Cost of Debt @ Mid-Year				6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%

NORTH WATER SYSTEM
Calculation of No-Cost Capital @ Mid-Year

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>	<u>Year 7</u>	<u>Year 8</u>	<u>Year 9</u>	<u>Year 10</u>
1. No-Cost Capital (Contributions & Grants, Schedule "A-3")										
a) Opening Balance	-	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641
b) Additions	25,858,641	-	-	-	-	-	-	-	-	-
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641	25,858,641
2. Accumulated Amortization (Schedule "A-4")										
a) Opening Balance	-	258,586	775,759	1,292,932	1,810,105	2,327,278	2,844,451	3,361,623	3,878,796	4,395,969
b) Additions	258,586	517,173	517,173	517,173	517,173	517,173	517,173	517,173	517,173	517,173
c) Retirements	-	-	-	-	-	-	-	-	-	-
d) Closing Balance	258,586	775,759	1,292,932	1,810,105	2,327,278	2,844,451	3,361,623	3,878,796	4,395,969	4,913,142
3. Net No-Cost Capital										
a) Opening Balance (Line 1. a) - Line 2. a))	-	25,600,055	25,082,882	24,565,709	24,048,536	23,531,363	23,014,190	22,497,018	21,979,845	21,462,672
b) Closing Balance (Line 1. d) - Line 2. d))	25,600,055	25,082,882	24,565,709	24,048,536	23,531,363	23,014,190	22,497,018	21,979,845	21,462,672	20,945,499
c) Total	25,600,055	50,682,936	49,648,591	48,614,245	47,579,899	46,545,554	45,511,208	44,476,862	43,442,517	42,408,171
4. Net No-Cost Capital @ Mid-Year	<u>12,800,027</u>	<u>25,341,468</u>	<u>24,824,295</u>	<u>24,307,123</u>	<u>23,789,950</u>	<u>23,272,777</u>	<u>22,755,604</u>	<u>22,238,431</u>	<u>21,721,258</u>	<u>21,204,086</u>

NORTH WATER SYSTEM
Utility Revenue Requirement and Postage Stamp Rate

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Year 1 (Notes 1, 2)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1. Water Purchases	-	-	-	-	-	-	-	-	-	-
2. Net Cash Operating Expenses (Schedule "D")	422,008	930,388	1,020,552	1,073,386	1,128,224	1,185,133	1,244,182	1,305,443	1,376,682	1,450,666
3. Non-Cash Expenses										
a) Depreciation (Schedule "A-2")	555,307	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614	1,110,614
b) Amortization of NCC (Schedule "A-4")	(258,586)	(517,173)	(517,173)	(517,173)	(517,173)	(517,173)	(517,173)	(517,173)	(517,173)	(517,173)
c) Total	296,720	593,441	593,441	593,441	593,441	593,441	593,441	593,441	593,441	593,441
4. Return (Schedule "B")	549,721	1,080,437	1,041,939	1,003,969	967,041	931,221	898,576	863,180	831,198	800,629
5. Gross Revenue Requirement	1,288,449	2,604,266	2,655,932	2,670,796	2,688,706	2,709,795	2,734,199	2,762,064	2,801,321	2,844,736
6. Total Water Consumption (m ³ /year)	1,829,755	4,150,428	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	5,619,223	5,863,467	6,107,712
7. Average Wholesale Cost of Water (\$/m ³)	0.693	0.627	0.572	0.552	0.534	0.518	0.504	0.492	0.478	0.466

Notes:

1. Year 1 is assumed to be 2002
2. Assuming Operation mid-year, July 1 of year 1

**NORTH WATER SYSTEM
Cash Operating Expenses**

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Account Code	Year 1 (Note 1)	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Maintenance	189,313	194,046	198,897	203,869	208,966	214,190	219,545	225,034	230,660	236,426
Operators	180,000	184,500	189,113	193,840	198,686	203,653	208,745	213,963	219,313	224,795
Power	118,693	137,981	158,159	168,944	180,169	191,851	204,003	216,643	231,712	247,398
Heating	77,682	90,306	103,512	110,570	117,917	125,562	133,516	141,788	151,650	161,916
Chemicals	278,327	323,556	370,872	396,162	422,485	449,877	478,374	508,014	543,348	580,131
Totals	422,008	930,388	1,020,552	1,073,386	1,128,224	1,185,133	1,244,182	1,305,443	1,376,682	1,450,666

Note 1: Half year total for Year 1 of operation (assumed to be 2002)

NORTH WATER SYSTEM

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

	Present - 2001			Estimated 2002 Consumption M ³ / Year	Estimated 2003 Consumption M ³ / Year	Future - 2004			Estimated 2005 Consumption M ³ / Year	Estimated 2006 Consumption M ³ / Year	Estimated 2007 Consumption M ³ / Year	Estimated 2008 Consumption M ³ / Year	5 Year Future - 2009			Estimated 2010 Consumption M ³ / Year	Estimated 2011 Consumption M ³ / Year	Estimated 2012 Consumption M ³ / Year	Estimated 2013 Consumption M ³ / Year	10 Year Future - 2014			20 Year Future - 2024			50 Year Future - 2054					
	Population	Consumption				Population	Consumption						Population	Consumption						Population	Consumption		Population	Consumption		Population	Consumption		Population	Consumption	
			Litre/Sec	M ³ / Year				Litre/Sec	M ³ / Year						Litre/Sec	M ³ / Year						Litre/Sec	M ³ / Year		Litre/Sec	M ³ / Year		Litre/Sec	M ³ / Year		Litre/Sec
Blackfalds	3,300	14.1	445,665	490,682	535,698	4,300	18.4	580,715	595,018	609,322	623,625	637,929	4,830	20.7	652,232	668,297	684,362	700,427	716,492	5,424	23.2	732,557	6,843	29.3	924,102	13,736	58.8	1,855,049			
Lacombe																															
Urban	9,232	39.5	1,246,782	1,381,832	1,516,882	12,232	52.4	1,651,932					14,180	60.7	1,915,041					15,502	66.4	2,093,532	17,991	77.0	2,429,629	28,121	120.4	3,797,705			
Industrial			-				15.0	473,040						20.0	630,720						40.0	1,261,440		40.0	1,261,440		40.0	1,261,440			
Total Lacombe	9,232	39.5	1,246,782	1,539,512	1,832,242	12,232	67.4	2,124,972	2,209,130	2,293,288	2,377,446	2,461,604	14,180	80.7	2,545,761	2,707,604	2,869,446	3,031,288	3,193,130	15,502	106.4	3,354,972	17,991	117.0	3,691,069	28,121	160.4	5,059,145			
Ponoka	6,703	28.7	905,240	919,023	932,807	7,009	30.0	946,590	961,221	975,853	990,484	1,005,115	7,551	32.3	1,019,746	1,035,508	1,051,270	1,067,032	1,082,794	8,134	34.8	1,098,556	9,440	40.4	1,274,920	14,756	63.2	1,992,802			
Other Industrial/ Residential Uses *				121,743	243,485		11.6	365,228	376,537	387,846	399,155	410,465		13.4	421,774	441,141	460,508	479,875	499,242		16.4	518,609		18.7	589,009		28.2	890,700			
Total Consumption - Towns			2,597,687	3,070,959	3,544,232			4,017,504	4,141,906	4,266,308	4,390,710	4,515,112			4,639,514	4,852,550	5,065,586	5,278,622	5,491,658												
Hobbema																															
Montana - Urban	102	0.4	13,775	14,201	14,627	111	0.5	15,052	15,532	16,011	16,491	16,970	129	0.6	17,450	18,006	18,562	19,117	19,673	150	0.6	20,229	201	0.9	27,186	489	2.1	65,988			
Montana - Rural	462	0.5	15,177	15,646	16,115	505	0.5	16,584	20,957	25,331	29,704	34,077	585	1.2	38,451	39,676	40,900	42,125	43,350	678	1.4	44,575	912	1.9	59,905	2,213	4.6	145,405			
Samson - Urban	1,453	6.2	196,228	202,293	208,358	1,588	6.8	214,423	221,254	228,084	234,914	241,745	1,841	7.9	248,575	256,494	264,412	272,330	280,249	2,134	9.1	288,167	2,868	12.3	387,272	6,960	29.8	940,011			
Samson - Rural	3,392	3.5	111,427	114,871	118,315	3,707	3.9	121,760	153,869	185,978	218,087	250,196	4,297	9.0	282,305	291,298	300,291	309,284	318,276	4,981	10.4	327,269	6,694	13.9	439,822	16,249	33.9	1,067,564			
Ermineskin - Urban	500	2.1	67,525	69,612	71,699	546	2.3	73,786	76,137	78,487	80,838	83,188	633	2.7	85,539	88,263	90,988	93,713	96,438	734	3.1	99,163	987	4.2	133,266	2,395	10.3	323,473			
Ermineskin - Rural	1,782	1.9	58,539	60,348	62,157	1,947	2.0	63,967	80,835	97,704	114,573	131,441	2,257	4.7	148,310	153,035	157,759	162,483	167,208	2,617	5.5	171,932	3,517	7.3	231,062	8,537	17.8	560,849			
Louis Bull - Urban	673	2.9	90,889	93,698	96,507	735	3.1	99,316	102,480	105,644	108,808	111,971	853	3.7	115,135	118,803	122,470	126,138	129,805	988	4.2	133,473	1,328	5.7	179,377	3,224	13.8	435,394			
Louis Bull - Rural	528	0.6	17,345	17,881	18,417	577	0.6	18,953	23,951	28,949	33,948	38,946	669	1.4	43,944	45,344	46,743	48,143	49,543	775	1.6	50,943	1,042	2.2	68,463	2,529	5.3	166,177			
Total Hobbema	8,892	18.1	570,904	588,550	606,196	9,717	19.8	623,842	695,015	766,189	837,362	908,535	11,264	31.1	979,709	1,010,917	1,042,126	1,073,334	1,104,543	13,058	36.0	1,135,751	17,549	48.4	1,526,354	42,596	117.5	3,704,863			
Total	28,127	100.5	3,168,591	3,659,509	4,150,428	33,258	147.2	4,641,346	4,836,922	5,032,497	5,228,072	5,423,648	37,825	178.2	5,619,223	5,863,467	6,107,712	6,351,956	6,596,201	42,119	216.9	6,840,445	51,823	253.9	8,005,454	99,209	428.2	13,502,558			

Assumptions

Urban Consumption based on 370 litres per person per day
Rural Consumption based on 180 litres per person per day
at 10% of urban consumption of Blackfalds, Lacombe and Ponoka

NORTH WATER SYSTEM
Population

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

2026	2027	2028	2029	2030	2031	2032	2033	30 2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	40 2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	50 2054
7,168	7,337	7,509	7,685	7,866	8,051	8,240	8,434	8,632	8,835	9,042	9,255	9,472	9,695	9,923	10,156	10,395	10,639	10,889	11,145	11,407	11,675	11,949	12,230	12,517	12,811	13,112	13,421	13,736
18,534	18,812	19,095	19,381	19,672	19,967	20,266	20,570	20,879	21,192	21,510	21,833	22,160	22,492	22,830	23,172	23,520	23,873	24,231	24,594	24,963	25,338	25,718	26,103	26,495	26,892	27,296	27,705	28,121
9,726	9,872	10,020	10,170	10,322	10,477	10,634	10,794	10,956	11,120	11,287	11,456	11,628	11,803	11,980	12,159	12,342	12,527	12,715	12,906	13,099	13,296	13,495	13,697	13,903	14,111	14,323	14,538	14,756
214	220	227	233	240	248	255	263	271	279	287	296	304	314	323	333	343	353	364	374	386	397	409	421	434	447	461	474	489
967	996	1,026	1,057	1,089	1,121	1,155	1,190	1,225	1,262	1,300	1,339	1,379	1,421	1,463	1,507	1,552	1,599	1,647	1,696	1,747	1,800	1,853	1,909	1,966	2,025	2,086	2,149	2,213
3,042	3,134	3,228	3,324	3,424	3,527	3,633	3,742	3,854	3,969	4,089	4,211	4,338	4,468	4,602	4,740	4,882	5,028	5,179	5,335	5,495	5,659	5,829	6,004	6,184	6,370	6,561	6,758	6,960
7,102	7,315	7,535	7,761	7,993	8,233	8,480	8,735	8,997	9,267	9,545	9,831	10,126	10,430	10,743	11,065	11,397	11,739	12,091	12,454	12,827	13,212	13,608	14,017	14,437	14,870	15,316	15,776	16,249
1,047	1,078	1,111	1,144	1,178	1,214	1,250	1,288	1,326	1,366	1,407	1,449	1,493	1,537	1,584	1,631	1,680	1,730	1,782	1,836	1,891	1,948	2,006	2,066	2,128	2,192	2,258	2,325	2,395
3,731	3,843	3,958	4,077	4,199	4,325	4,455	4,589	4,726	4,868	5,014	5,165	5,320	5,479	5,644	5,813	5,987	6,167	6,352	6,543	6,739	6,941	7,149	7,364	7,585	7,812	8,046	8,288	8,537
1,409	1,451	1,495	1,540	1,586	1,634	1,683	1,733	1,785	1,839	1,894	1,951	2,009	2,069	2,131	2,195	2,261	2,329	2,399	2,471	2,545	2,621	2,700	2,781	2,864	2,950	3,039	3,130	3,224
1,106	1,139	1,173	1,208	1,244	1,282	1,320	1,360	1,400	1,442	1,486	1,530	1,576	1,623	1,672	1,722	1,774	1,827	1,882	1,939	1,997	2,057	2,118	2,182	2,247	2,315	2,384	2,456	2,529
18,618	19,176	19,752	20,344	20,955	21,583	22,231	22,898	23,585	24,292	25,021	25,771	26,545	27,341	28,161	29,006	29,876	30,773	31,696	32,647	33,626	34,635	35,674	36,744	37,846	38,982	40,151	41,356	42,596
54,046	55,197	56,375	57,581	58,815	60,078	61,371	62,696	64,051	65,439	66,860	68,315	69,805	71,331	72,893	74,494	76,132	77,811	79,530	81,291	83,095	84,943	86,835	88,775	90,761	92,797	94,882	97,019	99,209

		NORTH WATER SYSTEM Population																								
		Population Projections				Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull																				
2001 - 2054		Present 2001	2002	2003	1 2004	2005	2006	2007	2008	5 2009	2,010	2,011	2,012	2,013	10 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	20 2024	2025
	Blackfalds	3,300	3,600	3,900	4,300	4,401	4,504	4,610	4,719	4,830	4,943	5,059	5,178	5,300	5,424	5,552	5,682	5,816	5,952	6,092	6,236	6,382	6,532	6,686	6,843	7,003
	Lacombe	9,232	9,600	10,800	12,232	12,599	12,977	13,366	13,767	14,180	14,606	14,825	15,047	15,273	15,502	15,734	15,970	16,210	16,453	16,700	16,950	17,205	17,463	17,725	17,991	18,260
	Ponoka	6,703	6,804	6,906	7,009	7,114	7,221	7,329	7,439	7,551	7,664	7,779	7,896	8,014	8,134	8,256	8,380	8,506	8,634	8,763	8,895	9,028	9,163	9,301	9,440	9,582
	Hobbema																									
	Montana - Urban	102	105	108	111	115	118	122	125	129	133	137	141	145	150	154	159	164	169	174	179	184	190	195	201	207
	Montana - Rural	462	476	490	505	520	536	552	568	585	603	621	640	659	678	699	720	741	764	787	810	834	859	885	912	939
	Samson - Urban	1,453	1,497	1,541	1,588	1,635	1,684	1,735	1,787	1,841	1,896	1,953	2,011	2,072	2,134	2,198	2,264	2,332	2,402	2,474	2,548	2,624	2,703	2,784	2,868	2,954
	Samson - Rural	3,392	3,494	3,599	3,707	3,818	3,932	4,050	4,172	4,297	4,426	4,559	4,695	4,836	4,981	5,131	5,285	5,443	5,606	5,775	5,948	6,126	6,310	6,499	6,694	6,895
	Ermineskin - Urban	500	515	530	546	563	580	597	615	633	652	672	692	713	734	756	779	802	826	851	877	903	930	958	987	1,016
	Ermineskin - Rural	1,782	1,835	1,891	1,947	2,006	2,066	2,128	2,192	225700%	2,325	2,395	2,467	2,541	2,617	2,695	2,776	2,860	2,945	3,034	3,125	3,218	3,315	3,414	3,517	3,622
	Louis Bull - Urban	673	693	714	735	757	780	804	828	853	878	904	932	960	988	1,018	1,049	1,080	1,112	1,146	1,180	1,216	1,252	1,290	1,328	1,368
	Louis Bull - Rural	528	544	560	577	594	612	630	649	669	689	710	731	753	775	799	823	847	873	899	926	954	982	1,012	1,042	1,073
	Total Hobbema	8,892	9,159	9,434	9,717	10,008	10,308	10,618	10,936	11,264	11,602	11,950	12,309	12,678	13,058	13,450	13,853	14,269	14,697	15,138	15,592	16,060	16,542	17,038	17,549	18,076
		28,127	29,162	31,039	33,258	34,122	35,011	35,923	36,861	37,825	38,815	39,613	40,430	41,265	42,119	42,993	43,886	44,801	45,736	46,693	47,673	48,675	49,700	50,749	51,823	52,921
Assumptions																										
Blackfalds - Add a further 1,000 in 3 years and then 2.35% annual increase thereafter																										
Lacombe - Add further 3,000 in 3 years due to Meridian/Industrial Growth, 3% annual increase until 2010 and																										
Ponoka - 1.5% annual increase																										
Hobbema - 3.0% annual increase																										
November																										
December (est)	16,614	68,346	518	43,288	144,435	3,899		277,100																		
Yearly Totals	16,614	68,346	518	43,288	144,435	3,899	0	277,100																		

NORTH WATER SYSTEM

RESIDENTIAL WATER SERVICE

	Service Charge	Block 1		Block 2		Block 3		Average Monthly Bill	Annual Cost	Comparative Cost
		Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)	Unit Rate (\$/m ³)	Max. Vol. (m ³)			
City of Airdrie	\$ 30.52	-	10	0.4570	10+			\$ 37.38	\$ 448.50	35.9%
City of Calgary	\$ 8.68	0.7882		-		-		\$ 28.39	\$ 340.62	3.2%
City of Camrose	\$ 15.93	1.1270						\$ 44.11	\$ 529.26	60.4%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 27.74	\$ 332.88	0.9%
City of Edmonton	\$ 3.55	0.9422	60	1.0073	>60			\$ 27.11	\$ 325.26	-1.4%
City of Fort Saskatchewan	\$ 12.50		10	1.0000	11+			\$ 27.50	\$ 330.00	0.0%
City of Fort McMurray	\$ 13.07	0.7657	23	1.0188	45	1.0457	46+	\$ 32.72	\$ 392.62	19.0%
City of Grande Prairie	\$ 5.00	0.8140						\$ 25.35	\$ 304.20	-7.8%
City of Leduc	\$ 7.45	0.8436						\$ 28.54	\$ 342.48	3.8%
City of Lethbridge	\$ 16.78	0.4120						\$ 27.08	\$ 324.96	-1.5%
City of Lloydminster	\$ 11.80		9.1	1.2254	4.5	1.1990	4.5	\$ 31.30	\$ 375.54	13.8%
City of Medicine Hat	\$ 7.03	0.3622						\$ 16.09	\$ 193.02	-41.5%
Parkland County	\$ 25.00	1.1500						\$ 25.00	\$ 300.00	-9.1%
City of Red Deer	\$ 9.68	0.3672						\$ 18.86	\$ 226.32	-31.4%
City of St. Albert	\$ 2.00	0.6417						\$ 18.04	\$ 216.51	-34.4%
City of Spruce Grove	* \$ 4.01	1.1400	(for water service only - \$1.5740 for W&S)					\$ 21.11	\$ 253.32	-23.2%
Strathcona County	\$ 5.36	0.8000						\$ 25.36	\$ 304.32	-7.8%
City of Wetaskiwin	\$ 9.80	0.8600	57	0.7211	>57			\$ 31.30	\$ 375.60	13.8%

Average Monthly Use (m³) 25.0 5/8" meter

* Combined water/sewer: 60% to water

NORTH WATER SYSTEM

COMMERCIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Monthly Bill	Cost	Cost
	Charge	(\$/m3)	(m3)	(\$/m3)	(m3)	(\$/m3)	(m3)			
City of Airdrie	\$ 225.22	-	10	0.4570	10+			\$ 305.20	\$ 3,662.34	59.8%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 289.67	\$ 3,476.09	51.7%
City of Camrose	\$ 15.93	1.1270						\$ 224.43	\$ 2,693.10	17.5%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 158.94	\$ 1,907.28	-16.8%
City of Edmonton	\$ 16.15	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 205.54	\$ 2,466.52	7.6%
City of Fort McMurray	\$ 99.74	0.9614	23	0.9846	45	1.0110	>46	\$ 285.05	\$ 3,420.64	49.2%
City of Fort Saskatchewan	\$ 18.50		12.5	1.0000	>12.5			\$ 191.00	\$ 2,292.00	0.0%
City of Grande Prairie	\$ 40.00	0.8150						\$ 190.78	\$ 2,289.30	-0.1%
City of Leduc	\$ 77.52	0.8633						\$ 237.23	\$ 2,846.77	24.2%
City of Lethbridge	\$ 42.91	0.7990	75	0.6180	675	0.4370	1,750	\$ 259.51	\$ 3,114.06	35.9%
City of Lloydminster	\$ 7.03		22.6	1.1660	113.6	0.9460	318	\$ 180.69	\$ 2,168.26	-5.4%
City of Medicine Hat	\$ 9.03	0.3622						\$ 76.04	\$ 912.44	-60.2%
Parkland County	\$ 25.00	1.1500						\$ 237.75	\$ 2,853.00	24.5%
City of Red Deer	\$ 159.01	0.3673						\$ 226.96	\$ 2,723.53	18.8%
City of St. Albert	\$ 14.22	0.6417						\$ 132.93	\$ 1,595.21	-30.4%
City of Spruce Grove	\$ 21.01	1.1400						\$ 231.91	\$ 2,782.92	21.4%
Strathcona County	\$ 4.85	0.6817						\$ 130.96	\$ 1,571.57	-31.4%
City of Wetaskiwin	\$ 39.40	0.8566	57	0.7211	>57			\$ 180.46	\$ 2,165.51	-5.5%
Average Monthly Use (m³)	185.0	2" meter								

NORTH WATER SYSTEM

INDUSTRIAL WATER SERVICE

		Block 1		Block 2		Block 3		Average	Annual	Comparative
	Service	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Unit Rate	Max. Vol.	Monthly Bill	Cost	Cost
	Charge	(\$/m3)	(m3)	(\$/m3)	(m3)	(\$/m3)	(m3)			
City of Airdrie	\$ 878.40	-	10	0.4570	10+			\$ 3,158.83	\$ 37,905.96	-37.0%
City of Calgary	\$ 19.14	0.9594	100	0.5650	1,000	0.4097	>1000	\$ 2,262.38	\$ 27,148.56	-54.9%
City of Camrose	\$ 15.93	1.1270						\$ 5,650.93	\$ 67,811.16	12.7%
City of Drumheller	\$ 22.00		18	0.8200	>18			\$ 4,107.24	\$ 49,286.88	-18.1%
City of Edmonton	\$ 57.80	0.8601	100	0.7196	1,000	0.6678	15,000	\$ 3,462.65	\$ 41,551.80	-31.0%
City of Fort McMurray	\$ 227.80	0.9614	23	0.9846	45	1.0110	>46	\$ 5,281.08	\$ 63,372.94	5.3%
City of Fort Saskatchewan	\$ 28.00		12.5	1.0000	>12.5			\$ 5,015.50	\$ 60,186.00	0.0%
City of Grande Prairie	\$ 157.50	0.8150						\$ 4,232.50	\$ 50,790.00	-15.6%
City of Leduc	\$ 310.99	0.8633						\$ 4,627.49	\$ 55,529.88	-7.7%
City of Lethbridge	\$ 124.77	0.4120						\$ 2,184.77	\$ 26,217.24	-56.4%
City of Lloydminster	\$ 13.15		9	1.3620	13.5	1.3356	18	\$ 6,679.26	\$ 80,151.08	33.2%
City of Medicine Hat	\$ 9.03	0.3622						\$ 1,820.03	\$ 21,840.36	-63.7%
Parkland County	\$ 25.00	1.1500						\$ 5,775.00	\$69,300.00	15.1%
City of Red Deer	\$ 568.34	0.3673						\$ 2,404.84	\$ 28,858.08	-52.1%
City of St. Albert	\$ 56.89	0.6417						\$ 3,265.39	\$ 39,184.68	-34.9%
City of Spruce Grove	\$ 431.64	1.1400						\$ 6,131.64	\$ 73,579.68	22.3%
Strathcona County	\$ 4.85	0.6817						\$ 3,413.35	\$ 40,960.20	-31.9%
City of Wetaskiwin	\$ 62.90	0.8566	57	0.7211	>57			\$ 3,676.06	\$ 44,112.67	-26.7%
Average Monthly Use (m³)	5,000.0	4" Meter								

NORTH WATER SYSTEM

Option 4 - Water Treatment, Blackfalds, Lacombe, Ponoka, Montana, Samson, Ermineskin and Louis Bull

Amortization Table

A simple amortization table covering 24 payment periods of a loan.

1) To use the table, simply change any of the values in the "initial data" area of the worksheet.

2) To print the table, just choose "Print" from the "File" menu. The print area is already defined.

Initial Data

LOAN DATA		TABLE DATA	
Loan amount:	\$17,649,879	Table starts at date:	
Annual interest rate:	6.250%	or at payment number:	1
Term in years:	20		
Payments per year:	1		0.065423886
First payment due:	12/31/2002		

PERIODIC PAYMENT

Entered payment: *The table uses the calculated periodic payment amount unless you enter a value for "Entered payment".*
 Calculated payment: \$1,570,173.27

CALCULATIONS

Use payment of: \$1,570,173.27 Beginning balance at payment 1: 17,649,878.96
 1st payment in table: 1 Cumulative interest prior to payment 1: 0.00

Table

No.	Payment Date	Beginning Balance	Interest	Principal	Ending Balance	Cumulative Interest
1	12/31/2002	17,649,878.96	1,103,117.43	467,055.84	17,182,823.12	1,103,117.43
2	12/31/2003	17,182,823.12	1,073,926.44	496,246.83	16,686,576.29	2,177,043.88
3	12/31/2004	16,686,576.29	1,042,911.02	527,262.26	16,159,314.03	3,219,954.90
4	12/31/2005	16,159,314.03	1,009,957.13	560,216.15	15,599,097.88	4,229,912.02
5	12/31/2006	15,599,097.88	974,943.62	595,229.66	15,003,868.23	5,204,855.64
6	12/31/2007	15,003,868.23	937,741.76	632,431.51	14,371,436.72	6,142,597.41
7	12/31/2008	14,371,436.72	898,214.79	671,958.48	13,699,478.24	7,040,812.20
8	12/31/2009	13,699,478.24	856,217.39	713,955.88	12,985,522.35	7,897,029.59
9	12/31/2010	12,985,522.35	811,595.15	758,578.13	12,226,944.22	8,708,624.74
10	12/31/2011	12,226,944.22	764,184.01	805,989.26	11,420,954.96	9,472,808.75
11	12/31/2012	11,420,954.96	713,809.69	856,363.59	10,564,591.37	10,186,618.44
12	12/31/2013	10,564,591.37	660,286.96	909,886.31	9,654,705.06	10,846,905.40
13	12/31/2014	9,654,705.06	603,419.07	966,754.21	8,687,950.85	11,450,324.46
14	12/31/2015	8,687,950.85	542,996.93	1,027,176.35	7,660,774.50	11,993,321.39
15	12/31/2016	7,660,774.50	478,798.41	1,091,374.87	6,569,399.63	12,472,119.80
16	12/31/2017	6,569,399.63	410,587.48	1,159,585.80	5,409,813.84	12,882,707.28
17	12/31/2018	5,409,813.84	338,113.36	1,232,059.91	4,177,753.93	13,220,820.64
18	12/31/2019	4,177,753.93	261,109.62	1,309,063.65	2,868,690.27	13,481,930.26
19	12/31/2020	2,868,690.27	179,293.14	1,390,880.13	1,477,810.14	13,661,223.40
20	12/31/2021	1,477,810.14	92,363.13	1,477,810.14	0.00	13,753,586.54