Water Management Operations

Water Management Operations, Alberta Environment
Submission to The International Joint Commission
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Water Management Operations

Alberta Environment plays an active role in the management of its water resources. Water Management Operations of Alberta Environment is assigned with the responsibility of managing, operating and maintaining the Provincially owned water management infrastructure.

History:

In 1943, the governments of Alberta and Canada signed an Agreement, whereby Canada agreed to construct certain water management works on condition that Alberta would take over the facilities.

The Agreement initiated construction of such works as the St. Mary River Irrigation Project and the supply and distribution systems for the Leavitt and Aetna Irrigation Districts. It also allowed the federal government in 1950 to take over and rehabilitate the Bow River project from the failing Canada Land and Irrigation Co.

In 1973, the governments of Canada and Alberta signed another Agreement transferring the Bow River project and the St. Mary River project to Alberta's control. As part of the exchange Canada agreed to rehabilitate the Western Irrigation District's Bow River diversion ($3.6 M in 1976), the Carseland-Bow River Diversion ($4.2 M in 1972) and the Eastern Irrigation District's Bassano dam ($15.9 M in 1986) and the Brooks aqueduct ($7.7 M in 1978).

The Province recognized that other headworks systems and district infrastructures were in very poor condition. This combined with its new ownership of the Carseland-Bow River and the Waterton-St. Mary headworks systems caused Alberta to re-evaluate its water management policy. In 1975, a joint position paper entitled, "Water Management for Irrigation Use" was issued by the Ministers of Environment and Agriculture. The paper described major policy decisions concerning;

1. the management of Alberta's total water resources,
2. the need for rehabilitation of the irrigation infrastructure, and
3. the contemplated requirements of future expansion.

The role of each department was defined as follows:

Alberta Environment (Water Management)

- Is charged with administration of the Water Resources Act.
- Is responsible for the management of Alberta's water resources.

- Is responsible for the operation and maintenance of all headworks to deliver water to Irrigation Districts and other users.
- Is responsible for funding the rehabilitation and improved operation and maintenance of the headworks systems, and for funding storage on the Oldman River system.

Alberta Agriculture (Irrigation Development)

- Is responsible for administration of the Irrigation Act.
- Is concerned with all aspects of irrigation farming and water distribution systems within irrigation District boundaries, in cooperation with District Boards.
- Is responsible for a funding program for the rehabilitation and expansion of irrigation district works.

Under the Heritage Program, between 1975 and 1995 Alberta Environment rehabilitated a number of major headworks systems (e.g. Lethbridge Northern Headworks, Western Headworks, United Irrigation District Headworks). Also at the time Alberta Environment constructed a number of major water management projects (e.g. Paddle River Dam in the North, Dickson Dam in the Red Deer River Basin and the Oldman River Dam) to meet the needs and improve efficiencies.

Alberta Environment continues to work with Alberta Transportation in implementing the rehabilitation program and constructing new water projects. Some of the new projects completed recently include the Pine Coulee Project, Little Bow River Reservoir Project and the Clear Lake Project.

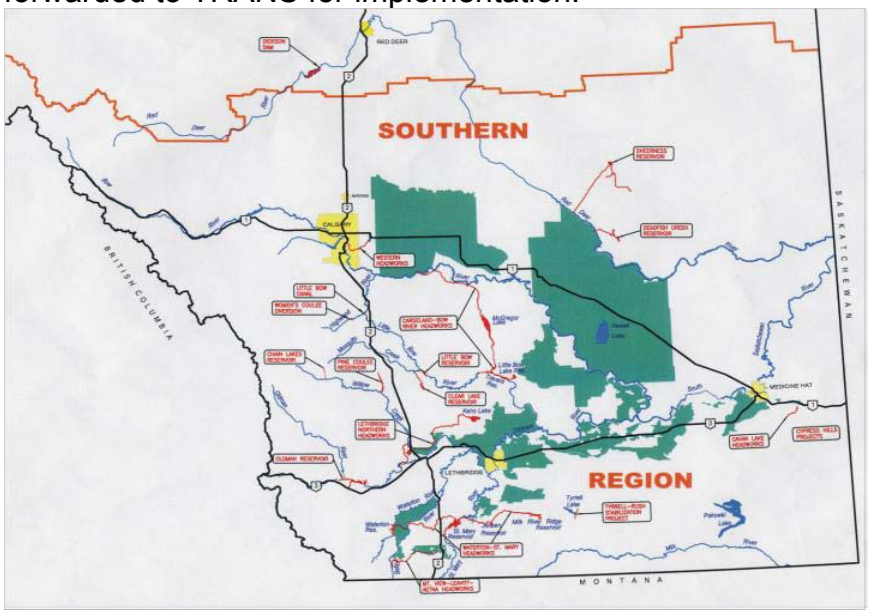
Operations

The Water Management Operations - Operations Group, consisting of the Southern and the Central/Northern Regional Teams, is responsible for operating and maintaining Alberta Environments (AENV) water management infrastructure projects in a safe, reliable and efficient manner for the benefit of Albertans. AENV's water management infrastructure projects have a current value of over $5 billion dollars and includes major on-stream reservoirs, offstream reservoirs, weirs, drainage ditches, lake stabilization, flood control, erosion control, major diversions, pumphouses, check structures, turnouts, wasteways, and drain inlets works. This infrastructure is operated to meet water users (irrigation districts, private irrigators, municipal, industrial, stockwater, household, hydropower, etc.) needs, recreational needs, flood and erosion control needs, instream flow objectives and apportionment requirements. In addition, AENV operates this infrastructure to minimize the impact of extreme events like floods and droughts within its licence limits under the Water Act.

Southern Operations Team

The Southern Operations Team is responsible for the operation, maintenance and management of more than 45 provincially owned water management infrastructure projects located within AENV's Southern Region (Oldman, Bow, South Saskatchewan and Lower Red Deer River Basins) that is valued at a cost of over $4 billion. These projects vary in size and complexity from a small flood control weir across a creek to a major irrigation headworks system like the Waterton-St. Mary Headwork System. Out of the 45 projects, 11 are headworks systems supplying water primarily to 11 of the 13 irrigation districts and to other users like the municipalities, industries and recreational users etc. The other projects include major on-stream reservoirs like to the Oldman River Dam, flood control dykes at Canmore and Drumheller, pumphouses, erosion control works etc.

The Southern Operations Team responsible for these projects has staff located in five different sites that include AENV's Lethbridge and Calgary Offices. For better efficiency, continuity and cost effectiveness, the Southern Operations Team also partners with Irrigation Districts and private contractors to operate some of the projects. To further enhance the operations and to provide closer monitoring, some of the projects have Supervisory Controls And Data Acquisition System, (SCADA) built into the major structures. Routine maintenance of these projects is carried by AENV in partnership with Alberta Transportation (TRANS). Identification of new projects and rehabilitation of existing projects are done in partnership with the Regional infrastructure Support's Capital Planning team and forwarded to TRANS for implementation.



Southern Region Water Management Projects Owned and Operated by Alberta Environment

The Southern Operations Team operates these projects to provide a wide range of benefits including:

- Water supply (irrigation, municipal, household, stockwater, industrial and non-domestic);
- Recreational opportunities;
- Drainage
- Flood control or management;
- Erosion control;
- Instream flow requirements;
- Enhancement of fish and wildlife habitat;
- Hydropower development;
- Apportionment;
- Drought management

Over the years Alberta Environment was successful in meeting these varying demands during low flow years by good communication with water users and stakeholders in a timely manner (e.g. 1995 Flood; 2001 Dry Year). During high flow years, systems are closely monitored and operational decisions are communicated to local authorities to safely manage flood events. Also communications are carried out in a timely manner with appropriate stakeholders so that the apportionment requirements are always met.

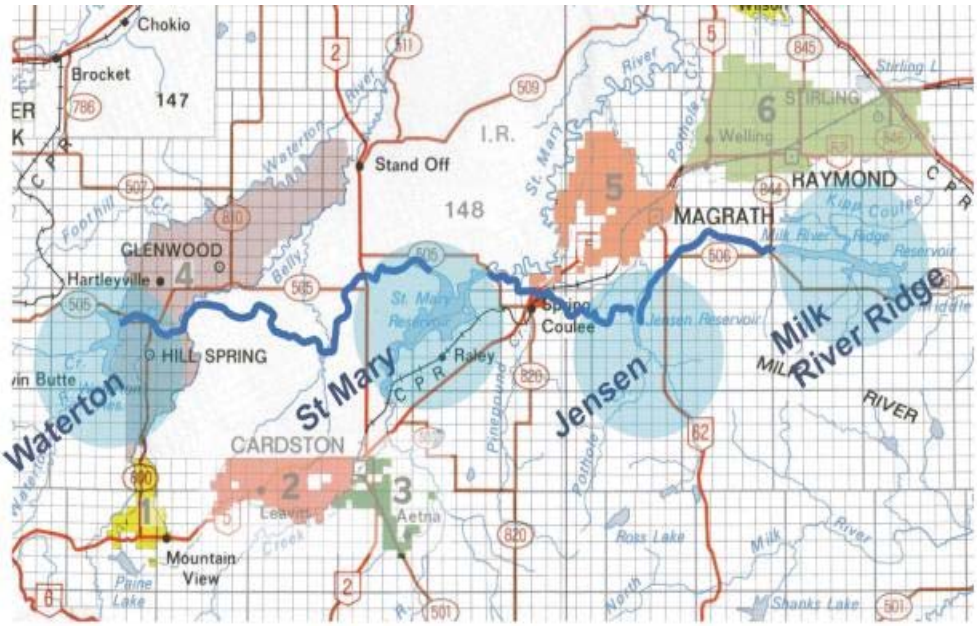
DESCRIPTION OF THE HEADWORKS SYSTEMS

A. Waterton - St. Mary Headworks System

i) Description

This system includes;

- Waterton River dam and reservoir
- Main canal - Waterton reservoir to Belly River (8 km)
- Belly River diversion
- Main Canal - Belly River to St. Mary Reservoir (43 km)
- St. Mary River dam and reservoir
- Main Canal - St. Mary Reservoir to Milk River Ridge Reservoir (42 km)
- Jensen reservoir
- Milk River Ridge Reservoir



Waterton St. Mary Headworks System

ii) History

This system diverts and interconnects water form the Waterton, Belly and St. Mary Rivers. It is the source of supply for downstream users along those rivers and for over 202,000 ha of irrigation in the Magrath, Raymond, St. Mary River and Taber Irrigation Districts. It is also the main supply for the 10,000 ha Blood Tribe Irrigation Project and supplies supplementary water for the United Irrigation District from the Waterton reservoir.

This system is a key component for water supply in Southern Alberta. It brings water form the Rocky Mountains for use right across southern Alberta to Medicine Hat.

Originally developed by coal mining interests in 1900, its source was a run of the river diversion on the St. Mary River, supplying water to 51,000 ha of land in the Magrath, Raymond, Lethbridge and Taber districts. However, as storage reservoirs were limited in number and capacity, water shortages were often experienced in the summer when river flows dropped.

In a joint undertaking by the federal and provincial governments, work started in 1946 on a new system which saw potential irrigation acreage expanded to 202,000 ha, three rivers tapped into (St. Mary, Belly and Waterton) and two major onstream dams were built.

On April 1, 1974 responsibility for this headworks system was transferred to Alberta.

Waterton Dam

iii) Operations

- Management staff located in Lethbridge and field staff at St. Mary dam are responsible for operation of the system which mainly includes operating structures at Waterton reservoir, Belly River diversion and St. Mary reservoir and monitoring a large number of related rainfall, snow pack, lake level, river flow and canal flow gauges.
- The St. Mary River Irrigation District operates the outlets from Milk River Ridge Reservoir that diverts water into their canal system.
- The Magrath and Raymond Irrigation Districts operate and maintain irrigation deliveries form the main canal between St. Mary and Milk River Ridge Reservoir.
- Operations are centered around maintaining target elevations at Waterton, St. Mary and Milk River Ridge reservoirs.

St. Mary Reservoir

iv) Maintenance

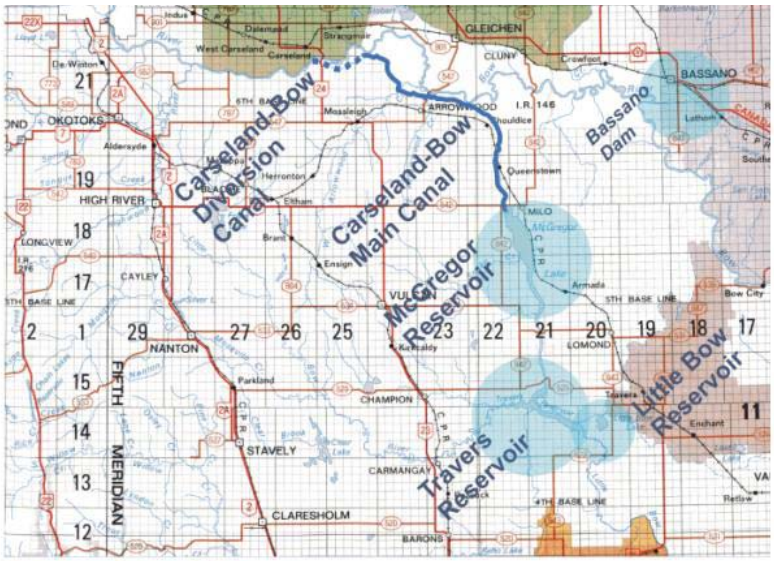
Belly Chute and Hydro Development

Provincial staff located at St. Mary dam are responsible for maintenance of the entire system with support from Alberta Transportation using their contractor.

Belly River Diversion

B. Carseland-Bow River Headworks System

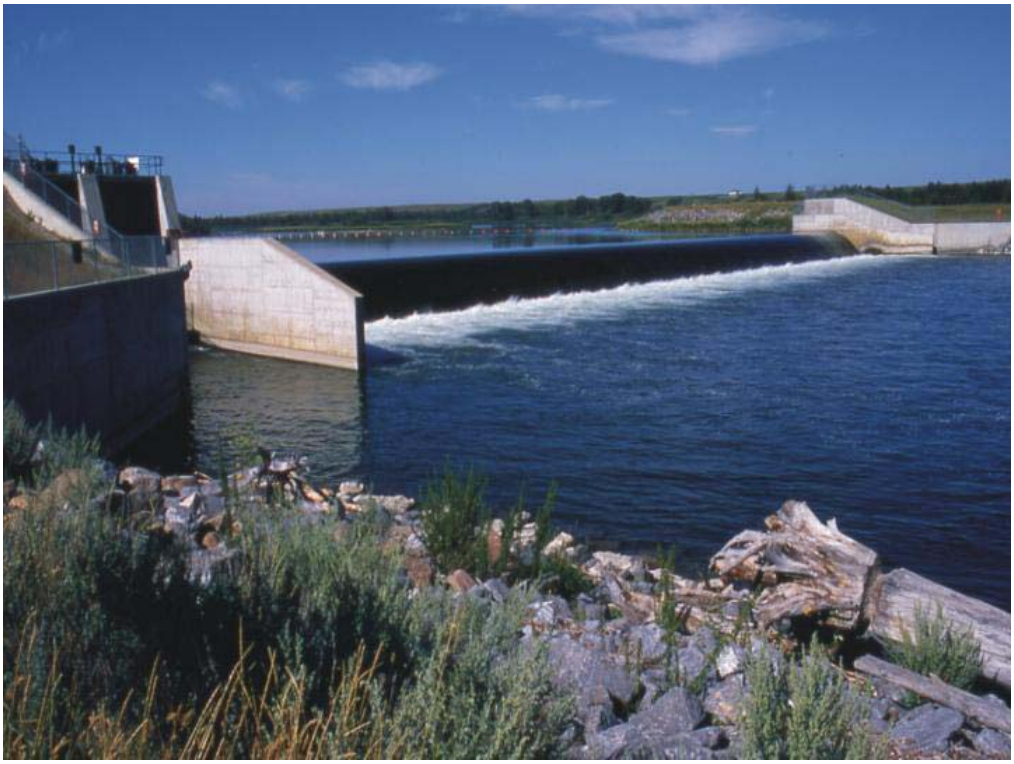
i) Description



Carseland-Bow
Headworks System

This system includes;

- Bow River diversion at Carseland
- Main Canal-Bow River to Lake McGregor reservoir (65 km
- Lake McGregor Reservoir
- Main Canal - Lake McGregor to Travers Reservoir (3 km
- Travers Reservoir
- Main Canal - Travers to Little Bow Reservoir (2.4 km)
- Little Bow Reservoir



Carseland Weir and Sluice Way

ii) History

Development began in 1906 by the British owned land development company (Southern Alberta Land Co.) to construct a system which would supply water to the Vauxhall area. Development of irrigation was not an economically profitable venture and continued in fits and starts until 1950 when the federal government took over control. In a joint effort with the Province of Alberta, the system was rebuilt and expanded.

In 1974, Alberta took control of the headworks portion of the system. The Bow River Irrigation District was formed to operate the distribution system.

This system supplies water to 85,000 ha of irrigated land in the Bow River Irrigation District and to 2,000 ha on the Siksika Reserve. It has significant recreational user in the region and supplies water to several municipalities.

In 1988 Alberta Environment entered into an agreement with the Siksika Nation for needed canal R/W for past trespass and needed for future rehabilitation of this system. Payment was $146,000 and is paid annually, indexed to inflation.

iii) Operations

Carseland Bow Headworks Canal

- The Province operates the river diversion and monitors the entire system with management staff headquartered at Calgary and field staff at Vulcan.
- The Bow River Irrigation District has been hired by the department to operate this system.
- The key to operating this system is meeting target reservoir elevations at McGregor and Travers reservoirs by making the appropriate river diversions.

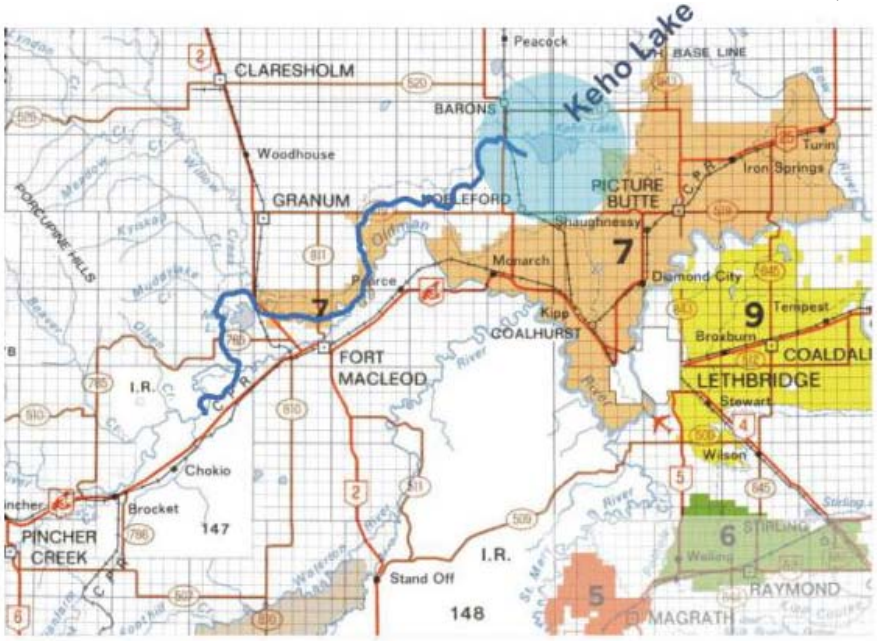
Lake McGregor Reservoir / Travers Reservoir and connecting Canal

iv) Maintenance

- Provincial employees at Vulcan shops are responsible for maintenance of the system with support from Alberta Transportation using their contractor.

C. Lethbridge Northern Headworks System

i) Description



Lethbridge Northern Headworks System

This system includes;

- Oldman River diversion on the Peigan Reserve
- Main Canal-Oldman river to Keho reservoir (80 km.)
- Keho reservoir

Lethbridge Northern Diversion

ii) History

Farmers in the Lethbridge Northern Irrigation District raised capital for this system by means of debentures. The works were built form 1921 - 1923. However the district suffered financially, resulting in a lack of maintenance. Its infrastructure was in a serious state of decay when it was transferred to Alberta in 1976.

In 1991, the Province began annual payments to the Peigan Tribe for access to and enlarging the R/W. Initial payment was $300,000 and is indexed to inflation. In 1994 the Province will pay over $500,000.

The Province has rehabilitated and expanded the headworks system, doubling the canal and Keho reservoir capacities.

iii) Operation

Lethbridge Northern Headworks - Oldman Flume and Canal

- Provincial staff at Fort Macleod operate the system. Provincial operations mainly involve the river diversion, adjusting three main canal checks and monitoring system flow gauges.
- The Lethbridge Northern Irrigation District is responsible to operate irrigation turnouts and the two major turnouts - Monarch Branch headgates and Keho reservoir outlet.

- River diversions are key to maintaining target elevations in Keho reservoir.

Willow Creek Flume

iv) Maintenance

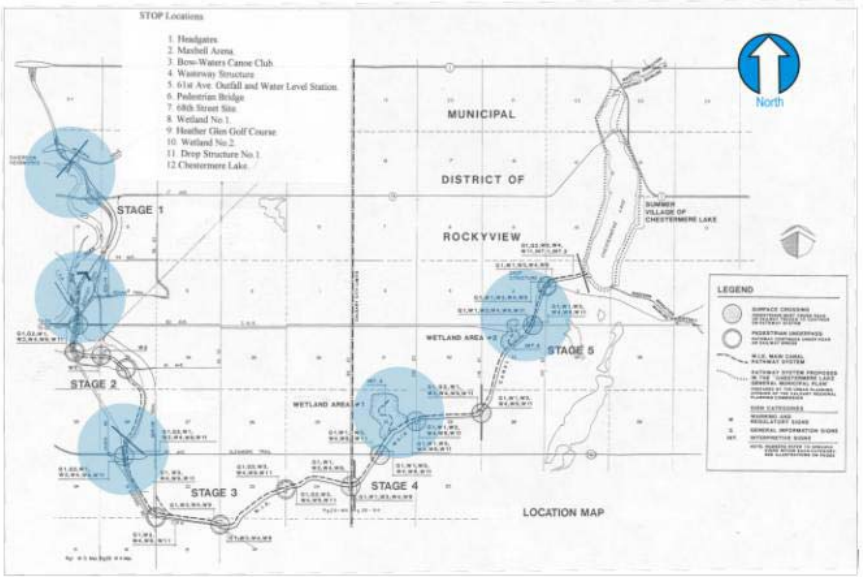
Lethbridge Northern Headworks Canal

- Alberta Environment staff at Fort MacLeod are responsible for maintenance work with support from Alberta Transportation using their contractor.

Keho Lake

D. Western Headworks System

i) Description

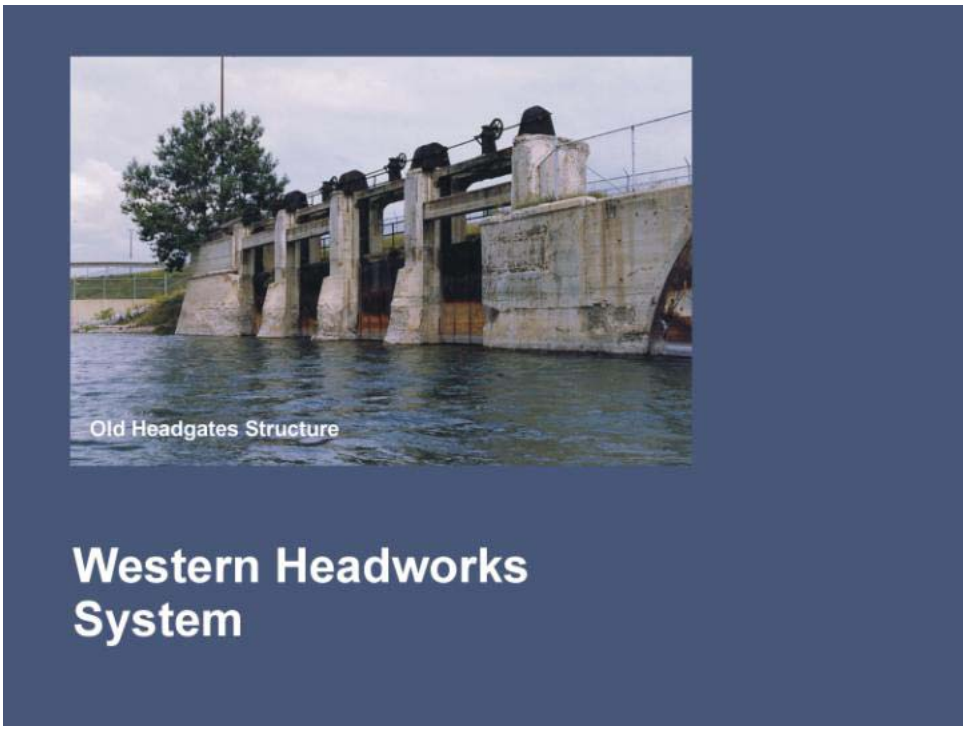


Western Headworks System

This system includes;

- Bow River diversion at Calgary
- Main Canal- Bow River up to (not including) Chestermere Lake (25 km.)

ii) History

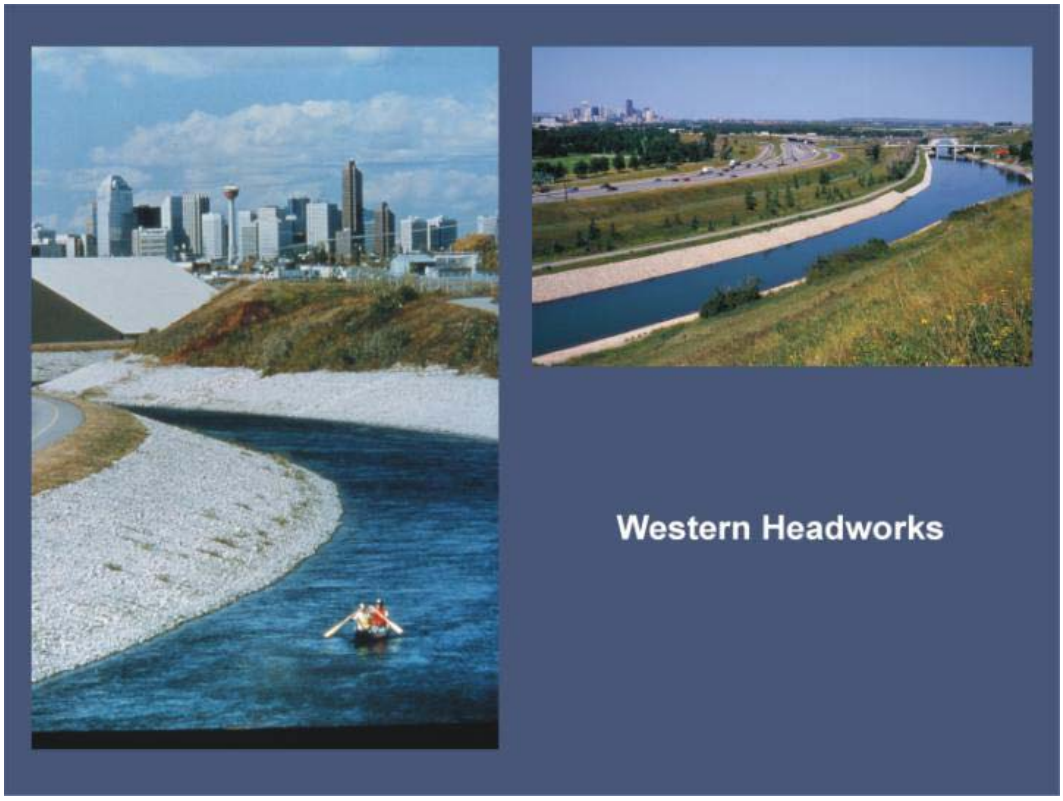


The system was built by the Canadian Pacific Railroad starting in 1903. Water deliveries commenced in 1907. The CPR hoped irrigation would attract more settlers, creating a market for their railroad.

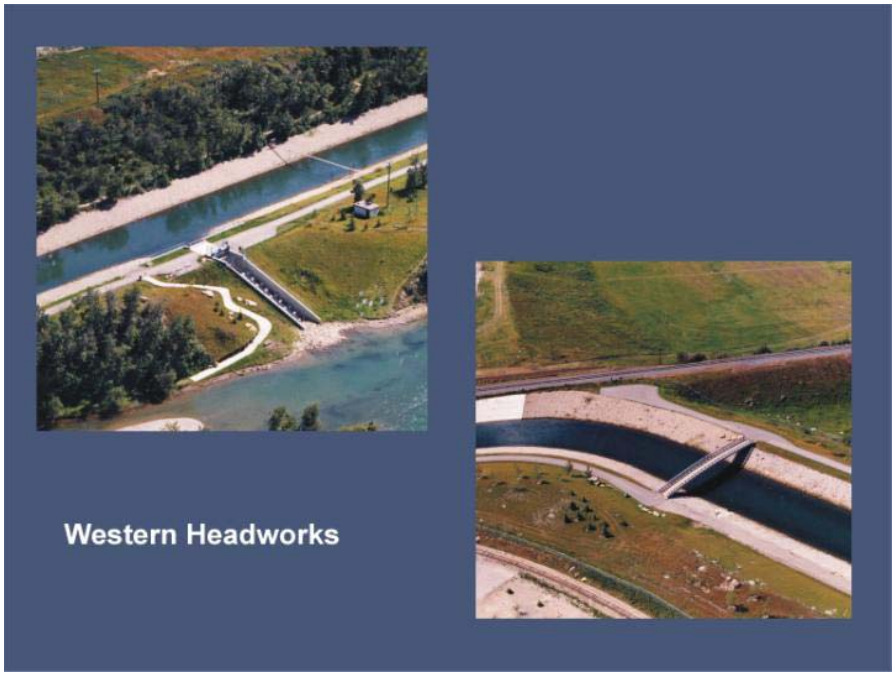
In 1944 the Western Irrigation District, organized by the landowners, took over ownership form the CPR. The District has an extensive delivery system with relatively few acres. It was costly to operate and maintain and was in a deteriorated state when the Province took over the headworks system in 1977.

The headworks were recently rehabilitated by Alberta Environment.

iii) Operations

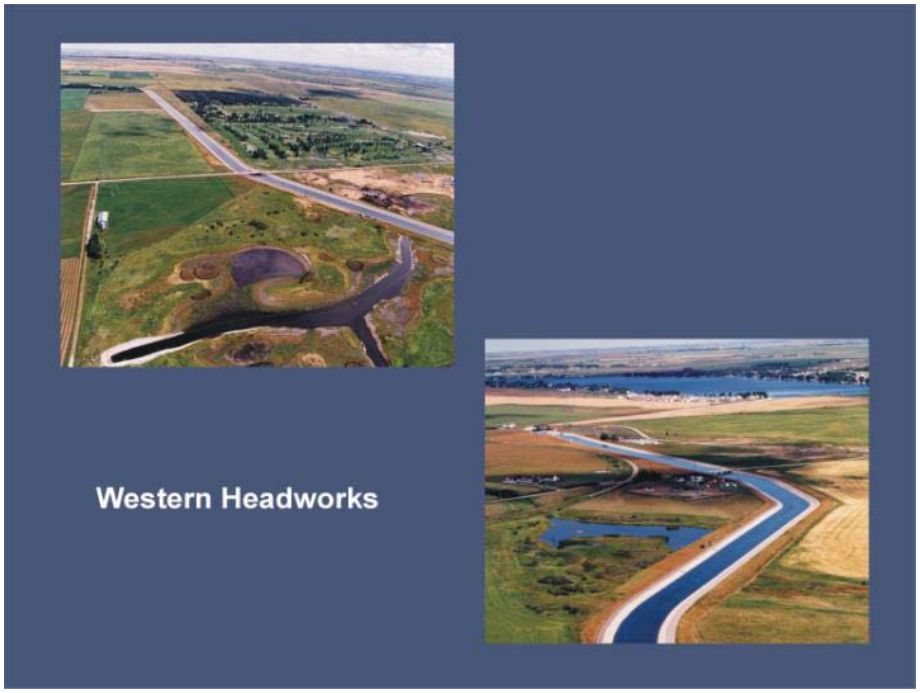


- The Western Irrigation District operates the river diversion under contract to the Department of Environment. This was deemed expedient as the District is responsible for the lake level of Chestermere reservoir and storage is negligible in the reservoir.
- Alberta Environment provides emergency back-up for operations.



iv) Maintenance

- Department staff headquartered in Calgary perform maintenance on this system using contractors and with support from Alberta Transportation using their contractor.
- Agreements with the City of Calgary and the M.D. of Rockyview have been signed for "park" type maintenance of bicycle paths, trees and grass.



E. Mountain View, Leavitt, Aetna Headworks System

i) Description

This system includes;

- Belly River diversion
- Main Canal - Belly River to Payne Lake reservoir (5 km.)
- Payne Lake Reservoir
- Main Canal - Payne Lake reservoir to Aetna Irrigation District (34 km.)

ii) History

Local landowners formed the Mountain View Irrigation District in 1923. Construction began in 1925.

In 1937, the federal government rehabilitated the main canal form the Belly River to Payne Lake reservoir, enlarged the reservoir and extended the main canal eastward to supply the newly formed Leavitt Irrigation District.

In 1945 the federal government constructed another extension of the main canal across two large coulees to supply the Aetna Irrigation District.

The Privy Council orders in 1951 and in 1954 transferred the administration, control and management of the headworks to Alberta, which has operated it ever since.

Several years ago the department tried to get Leavitt and Aetna Irrigation Districts to assume responsibility and maintenance of the main canal downstream of Payne Lake reservoir. A compromise was reached whereby the districts agreed to pay Alberta Environment $1.00/assessed acre for a 5 year period. After which the terms would be reviewed.

The headworks system supplies water to 12,000 acres of irrigated lands in the three irrigation districts. The Town of Cardston now is using this system as a water supply source. Payne Lake reservoir is a major regional recreation site.

iii) Operations

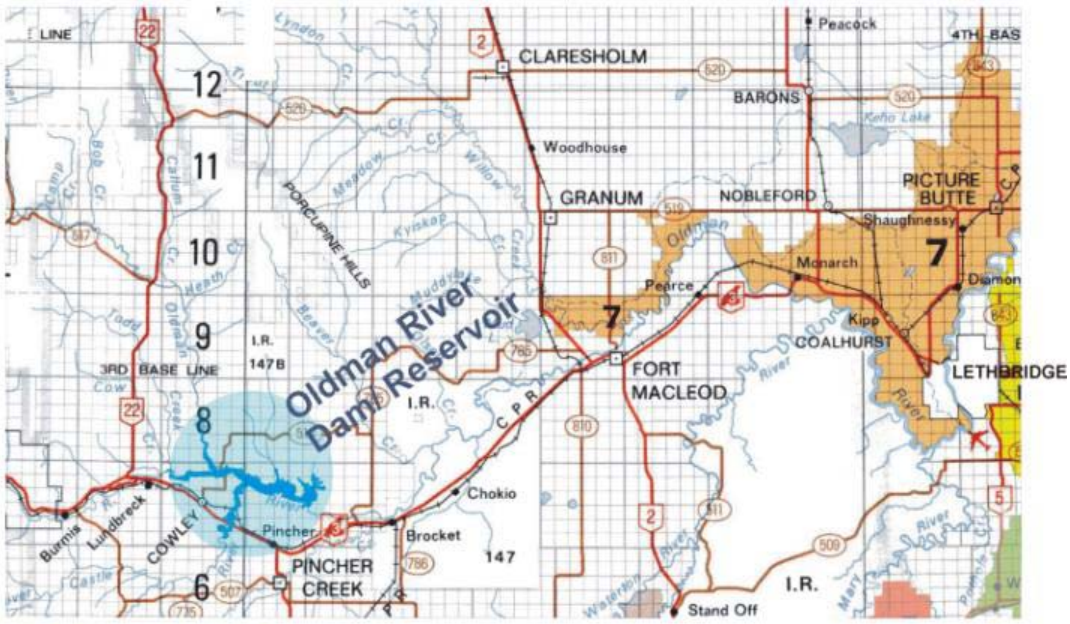
Alberta Environment has hired the MVID manager to operate the system. The LID ditchrider has been hired as a relief operator.

iv) Maintenance

Alberta Environment performs maintenance work utilizing either the department staff from St. Mary dam or local contractors or with support from Alberta Transportation using their contractor.

F. Oldman River Dam and Reservoir

i) Description



Oldman River Dam and Reservoir

This system includes;

- Earth dam – 7,645,000 cu. m, 76.2m. high, 609.6m. wide
- Spillway - 7 - 10.6m X 7.9m gates, 85m wide, 352m long
- Tunnels - 2 - 6.4m diameter X 914.4m long
- Reservoir - surface area of 2,428ha, storage capacity of 493,000 cu. dam.

Oldman River Dam Spillway and Reservoir

ii) History

The Oldman reservoir was built from 1986 to 1991 by the Province of Alberta. It is one of the most important water management structures in the South Saskatchewan River basin.

It will provide a stable supply of water for irrigation expansion, fish habitat, water quality and recreation. It will allow Alberta to do all this and still meet its apportionment requirements to the other Prairie Provinces.

iii) Operations

Oldman River Dam Spillway in Operation

On site, provincial staff operate the facility

iv) Maintenance

On site staff with support from Alberta Transportation using their contractor maintain the dam and reservoir works, which includes not only the dam and its related works, but also the multi-million dollar infrastructure constructed to mitigate environmental impacts.

G. Cavan Lake Headworks System

i) Description

This system includes;

- Gros Ventre Creek diversion
- Main Canal - Gros Ventre creek to Cavan reservoir (6.4 km.)

- Cavan Lake reservoir
- Ross Creek Diversion

ii) History

This system was constructed in 1950 by the federal government as a joint undertaking with the Province. It was operated and maintained by the Ross Creek Irrigation District until 1993 when ownership of the headworks portion was transferred to Alberta Environment. It supplies water to 4,850 ha of irrigated lands in the Ross Creek Irrigation District. Cavan Lake is heavily used for recreation and fishing.

iii) Operations

Operations of the headworks are performed by the district under contract to the Province.

iv) Maintenance

Maintenance work is the responsibility of Environment. Maintenance work is performed by department staff with support from Alberta Transportation using their contractor in combination with maintenance on other department owned water management projects in the Cypress Hills area.

H. United Headworks System

i) Description

This system includes;

- Belly River Diversion
- Main Canal - Belly River to Cochrane Lake (16 km.)
- Cochrane Lake reservoir
- Turnout from Waterton - Belly Canal.

ii) History

The United Irrigation District was constructed in the early 1920's by the local landowners and was intended to irrigate 13,760 ha of land between the Belly and Waterton Rivers.

It was often in financial difficulty. Less than one-half of the assessed acres are irrigated. Farmers not using the irrigation system do not want to increase the water rates. Consequently, little maintenance work was done over the years, to the point where the main canal had only one-third of its original capacity.

In 1978, Alberta Environment installed a turnout from its Waterton-Belly canal into Cochrane Lake to provide the district with a supplemental water supply, to be used when the Belly river flow was too low to meet the district's requirements.

In early nineties the department completed rehabilitation of the district's headworks system. The United Irrigation District still owns these works but is negotiating their transfer to the Province. (A portion of the UID Belly river diversion works on the Blood Reserve is already controlled by Alberta through agreement with the Blood Tribe and the District.)

iii) Operations

If the headworks were to be transferred, it is likely that the district would be retained to operate the system.

iv) Maintenance

Staff from St. Mary dam would be assigned responsibility for maintenance of these headworks with support from Alberta Transportation using their contractor.

In summary above is a description of some of the major works owned, operated, maintained and managed by Alberta Environment in Southern Alberta. The Projects not described in detail above include the recently constructed Projects like the Pine Coulee Project, Little Bow River Reservoir Project and some of the older Projects like the Sheerness-Deadfish Water Supply Project, Highwood

River Diversions etc.. Attached is a Project Map with the Project Costs of the Projects managed by Alberta Environment.

BASIN OPERATIONS

As the requirements for water in the South Saskatchewan River Basin increase, so does the need to provide overall coordination for basin operations.

Water demand is rising and will continue to see significant increases due to the following:

- Expansion limits allow a 21% increase in irrigated acreage in the South Saskatchewan River Basin over the 1992 level.
- Alberta Agriculture, Food and Rural Development predicts that irrigators will increase the amount of water applied to irrigated crops in order to maximize financial returns.
- Recreational demand on water is skyrocketing both for instream user (fishing, boating) and for reservoir based recreation (cottage, boating, fishing). The two are not always compatible.
- Instream Flow Needs are a major consideration in any operational strategy. Water quality, fish habitat and riparian vegetation needs are demanding that river flows be regulated to meet the dynamics of instream Flow Needs.

All of the foregoing may require dramatic changes in operating plans in order to satisfy the increasing and changing water demands, keeping in mind that we must still honour existing licences and meet Alberta's obligations under the Apportionment Agreement.

Operations in the South Saskatchewan River Basin will have to be increasingly coordinated to ensure Alberta Environment can meet its mandate for water management. Operations of the headworks systems will play a significant role in allowing the Province of Alberta to meet its many obligations and achieve its policy of managing the water supply for multipurpose use.