

Memo Comparing Red River Valley Water Supply Project Alternatives

In 1994, a group of federal, state and local stakeholders began a study of the future water supply needs of the Red River Valley. This group was challenged to explore and research options that would ensure a reliable water supply for the Red River Valley during a drought. As part of the process, the team identified a number of alternatives to supply the Red River Valley with water. This memo evaluates seven alternatives that were studied as part of the Environmental Impact Statement (EIS).

When these alternatives are compared, it becomes clear that the GDU Import to the Sheyenne River Alternative is the best method to solve the water supply needs of the Red River Valley. This alternative provides the most benefits to the natural environment, meets the municipal, rural and industrial (MR&I) need estimated through the year 2050, is the least costly Missouri River import alternative to construct and the least costly of all alternatives to operate.

Analysis of Alternatives

The alternatives studied for the Red River Valley Water Supply Project include utilizing water sources from within the Red River Basin and from the Missouri River. All of the alternatives, except one, were designed to supplement the existing sources that systems currently use. One alternative was a complete replacement alternative, patterned after the Northwest Area Water Supply (NAWS) and the Southwest Pipeline Project (SWPP). The alternative was sized to replace all of the current water supplies used for MR&I purposes in the Red River Valley.

The primary water supplies studied to provide the supplemental water for the project include:

- Capturing Red Lake River and Lower Red River flows and storing them in Lake Ashtabula
- Minnesota groundwater located approximately 50 miles southeast of Fargo
- Lake of the Woods
- Missouri River

In-Basin Alternatives

The environmental impact analysis showed that capturing Red Lake River and Lower Red River flows for the North Dakota In-Basin Alternative would impact flows downstream of Grand Forks and cause concerns with downstream users and Canada. The alternative could meet the projected MR&I need but *could not meet the recommendations from ND Game and Fish for aquatic needs flows on the Sheyenne River as there was not sufficient water available.*

The Red River Basin Alternative, the Minnesota groundwater option, would meet the MR&I need and offer options to phase the construction of the wellfield to meet demands as the population grows. The conditions that Minnesota would place on the use of these aquifers were identified in their correspondence dated December 17, 2001. Development of this water supply would involve three integrated parts, to be developed into a binding agreement between Minnesota and North Dakota and participating municipalities, including:

- A) Obtaining water from Minnesota for municipalities along the Red River for use only during drought, and on a temporary basis.
- B) Development of a long-term, multi-faceted water conservation program that would be invoked when the drought cycle becomes apparent.

- C) Development of an effective program and commitment by North Dakota to focus economic development on industries and commercial enterprises that do not consume water, and making it clear in regulatory permits that new water-using industries will need to plan for obtaining water on their own for use during droughts.

Minnesota would retain the right to reduce the water permitted from the aquifer in the future, if conditions warranted. According to Minnesota law, they have a policy that discourages export of water out of state, and any permit over one million gallons per day is required to be approved by the Minnesota legislature. There was significant opposition in the local area to this project which may have made obtaining legislative approval difficult. These factors contributed to the determination that *this alternative was not a reliable source of water for the residents and industries in eastern North Dakota.*

The Lake of the Woods Alternative was eliminated from further consideration in the Supplemental Draft EIS because of comments from the state of Minnesota stating they *would not permit the use of water from the Lake of the Woods for this project.*

Missouri River Import Alternatives

After much research, discussion and dissemination of data, the Missouri River became the logical choice. It is a reliable water source that North Dakota has the right to put to use for the benefit of the state. The alternatives using the Missouri River included:

- The GDU Water Supply Replacement Pipeline Alternative
- GDU Import Pipeline Alternative - a direct pipeline from the McClusky Canal to Fargo
- Missouri River Import to the Red River Valley Alternative - a direct pipeline from the Missouri River near Bismarck to the Red River Valley water systems
- GDU Import to the Sheyenne River Alternative - a pipeline from the McClusky Canal to Lake Ashtabula

The GDU Water Supply Replacement Pipeline Alternative, patterned like NAWS and the SWPP, was eliminated from further consideration because of cost. It was estimated to cost \$2.2 billion.

The GDU Import Pipeline Alternative could be an extension of the GDU Import to Sheyenne River Alternative if funds became available. Therefore, the analysis became a comparison between the GDU Import to Sheyenne River Alternative and the Missouri River Import to the Red River Valley Alternative.

To compare these, it is important to understand how they were designed to operate. The GDU Import to the Sheyenne River Alternative was designed to operate using the following criteria:

- When flows in the Red River downstream of Fargo drop to 70 cubic feet per second (cfs), the water systems in the Fargo area would use a combination of Red River flows and natural flows in the Sheyenne River leaving the remaining 70 cfs natural flows in the Red River for the aquatic environment.
- When natural flows in the Sheyenne and Red River were not sufficient to meet the MR&I water demand and aquatic needs, the systems would call for water from storage in Lake Ashtabula.
- When flows into Lake Ashtabula could not maintain the water levels at the normal operating pool, the GDU Import to the Sheyenne River Alternative would be turned on to add additional water to Lake Ashtabula.

- In addition to meeting the MR&I needs, the alternative would also provide water to meet the ND Game and Fish recommended flows on the Sheyenne River to maintain the aquatic environment. The recommend flows are:
 - 23 cubic feet per second cfs minimum flows
 - Spring flush of 215 cfs for 48-72 hours
 - In April, 69 cfs minimum flow

The Missouri River Import to the Red River Valley Alternative was designed to operate using the following criteria.

- When flows in the Red River are not sufficient to meet the needs for the Fargo area, systems would use a combination of Sheyenne River natural flows and Red River flows. The design was modeled to use all of the water out of the Red River at Fargo and not leave any flows for the aquatic environment. Moorhead would use a combination of Red River flows and the Buffalo Aquifer.
- When flows in the Red River and the Sheyenne River are not sufficient, the systems in the Fargo area would use a combination of river flows, the Buffalo Aquifer and the Missouri River pipeline.
- When the pipeline, the Buffalo Aquifer, and natural flows are not sufficient, the systems would call for water out of storage from Lake Ashtabula.
- The aquatic needs flows in this alternative consist of a 13 cfs minimum release from Baldhill Dam for the Sheyenne River.

Comparison of the GDU Import to Sheyenne River and Missouri River Import to Red River Valley alternatives

The different designs provided an impact analysis to determine the difference in adverse impacts and the beneficial impacts of different operational criteria. If the operations were the same for both alternatives, the Missouri River Import to the Red River Valley Alternative would need to be sized larger and be configured to supply water to Lake Ashtabula to meet the ND Game and Fish recommendations for the Sheyenne River aquatic needs. This would increase the cost of the alternative.

Environmental Impacts:

The GDU Import to the Sheyenne River Alternative provides benefits to the following resources that the Missouri River Import to the Red River Valley Alternative does not:

- Sheyenne Delta Aquifer
- Sheyenne River fish
- Sheyenne River mussels
- Red River fish
- Protected areas of riparian habitat along the Sheyenne River

The Missouri River Import to the Red River Valley Alternative has adverse impacts to the Sheyenne River mussels.

Annual Average Missouri River Depletions

	GDU Import to Sheyenne River	Missouri River Import to Red River Valley
Minimum	1,192 acre-feet	21,382 acre-feet
Maximum	86,469 acre-feet	68,769 acre-feet
Average	31,686 acre-feet	28,111 acre-feet

Using the natural conveyance system of the Sheyenne and Red Rivers, versus using a pipeline does not significantly change the volume of water needed from the Missouri River.

Life expectancy:

Both alternatives were designed using similar design criteria and materials. Both are expected to operate for a minimum of 100 years. The Principal Supply Works, consisting of the Snake Creek Pumping Plant, Lake Audubon and the McClusky Canal, utilized in the GDU Import to Sheyenne River Alternative have been properly maintained since they were constructed. These facilities are also expected to continue to operate for a minimum of 100 years.

Construction Costs:

The GDU Import to the Sheyenne River Alternative is estimated to cost \$659.8 million. The Missouri River Import to the Red River Valley Alternative is estimated to cost \$1.065 billion. The GDU Import to the Sheyenne River Alternative costs 38% less to construct. If the alternatives were designed to provide the same environmental benefits, the cost difference would be greater.

Annual Operations, Maintenance and Repair (OM&R) Costs:

The following are the estimated costs to operate the system, maintain the project and to replace the project. It does not include the costs to operate and maintain the biota treatment plant as those costs are the responsibility of the federal government. This comparison is intended to show water systems and the state what the difference would be annually for the local costs. These estimates are based on the cost to deliver the average annual volume of water.

	GDU Import to Sheyenne River (31,700 acre-feet)	Missouri River Import to Red River Valley (28,200 acre-feet)
Facility costs	\$ 96,000	\$ 257,000
Equipment & labor costs	942,000	1,158,000
Power costs	78,000	1,564,000
Total OM&R costs	\$1,116,000	\$2,979,000

The GDU Import to the Sheyenne River Alternative is estimated to cost the local systems 62% less to operate than the Missouri River Import to the Red River Valley Alternative.

Financing Drought Protection:

Because both of these alternatives are a supplemental water supply, they would be financed in the same manner. The total construction cost will be allocated to each system based on the capacity dedicated to each system in the main water supply pipeline. Each system will determine the capacity they are willing to pay for and will be charged based on that capacity. Financing the project based on the volume of water delivered will not work, since the project will operate only when there is a need for project water.

Revenue bonds will be used to pay for the construction of the project. These revenue bonds will be secured by water service contracts. Payments will include OM&R and will begin at the start of construction to reduce the costs. The repayment period acceptable to the water systems is 80 years.

The other option for the water system's share of the project cost is a federal loan from the Bureau of Reclamation. The interest for this loan was set in the Dakota Water Resources Act at 3.25%. The payments would be based on the estimated population in 2050 and set up based on 40-year contracts until paid.

Preferred Alternative Benefits

The GDU Import to the Sheyenne River Alternative, the preferred alternative uses the existing Principal Supply Works, Lake Ashtabula and the Sheyenne and Red Rivers to capture, store and deliver water to the water systems in the Red River Valley. Utilizing these existing facilities provides the lowest cost Missouri River alternative to construct and operate. This alternative also uses the least amount of energy to operate.

The GDU Import to the Sheyenne River Alternative is the best solution for solving the Red River Valley's water supply problems. It provides

- More flexibility – it utilizes the storage capacity of Lake Ashtabula (69,000 acre-feet)
- The most environmental benefits – it provides water for the Sheyenne River aquatic environment at critical times and leaves water in the Red River for the aquatic environment
- Low capital costs – it is the lowest cost Missouri River import alternative to construct
- Lower O&M Costs – it has the lowest O&M costs of all the alternatives



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