MINUTES

North Dakota State Water Commission
Bismarck, North Dakota

February 8, 2018

The North Dakota State Water Commission (State Water Commission or Commission) held a meeting at the Brynhild Haugland Room, State Capitol, Bismarck, North Dakota, on February 8, 2018. Governor Doug Burgum, Chairman, called the meeting to order at 1:05 p.m., and requested Garland Erbele, State Engineer, and Chief Engineer-Secretary to the State Water Commission, call the roll. Governor Burgum announced a quorum was present.

STATE WATER COMMISSION MEMBERS PRESENT:

Governor Doug Burgum, Chairman
Doug Goehring, Commissioner, North Dakota Department of Agriculture, Bismarck
Katie Andersen, Jamestown
Michael Anderson, Hillsboro
Richard Johnson, Devils Lake
Leander McDonald, Bismarck
Mark Owan, Williston
Matthew Pedersen, Valley City
Jason Zimmerman, Minot

OTHERS PRESENT:

Lieutenant Governor Brent Sanford
Leslie Bakken-Oliver, General Counsel, Governor's Office
Garland Erbele, State Engineer, and Chief Engineer-Secretary,
North Dakota State Water Commission, Bismarck
State Water Commission Staff
Approximately 50 people interested in agenda items.

The attendance register is on file with the official minutes.

The meeting was recorded to assist in compilation of the minutes.

The Governor and First Lady were co-sponsors of Giving Hearts Day. The goal for North Dakota was 50,000 individuals donating to 400 different charities. If the goal is met, North Dakota would be one of the most generous states in the country.

CONSIDERATION OF AGENDA AND SELECTION OF VICE CHAIRMAN:

The agenda for the February 8, 2018, State Water Commission meeting was presented; there were no modifications.

House Bill No. 1374 requires State Water Commission to select an appointed member to serve as vice-chairman of State Water Commission.

> **It was moved by Commissioner McDonald, seconded by Commissioner Owan, and unanimously carried, that Richard Johnson be nominated and voted in as Vice-Chairman.**

CONSIDERATION OF DRAFT MINUTES OF DECEMBER 8, 2017, AND JANUARY 11, 2018:

The draft minutes of the December 8, 2017, and January 11, 2018, State Water Commission meetings were reviewed; there were no modifications.

> **It was moved by Commissioner Owan, seconded by Commissioner Andersen, and unanimously carried, that the minutes of December 8, 2017, and January 11, 2018, be approved as presented.**

STATE WATER COMMISSION FINANCIAL REPORTS:

The Allocated Program Expenditures for the period ending December 31, 2017, were presented and discussed by David Laschkewitsch, State Water Commission's Director of Administrative Services. The expenditures, in total, are within the authorized budget amounts.

The Project Summary for the 2017-2019 Biennium, **APPENDIX A**, provides information on the committed and uncommitted funds from the Resources Trust Fund and the Water Development Trust Fund. The final summary for projects shows approved projects totaling $541,163,486 with expenditures of $87,341,832. A balance of $141,105,529 remains available to commit to projects in the 2017-2019 biennium.

The oil extraction tax deposits into the Resources Trust Fund total $64,450,357 through January 2018 and are currently $1,615,643 or 2.5 percent below budgeted revenues.

No deposits have been received for the Water Development Trust Fund this biennium. The first planned deposit is for $9,000,000 in April 2018.

STATE WATER SUPPLY FUNDING – MUNICIPAL CONSTRUCTION:

LINCOLN WATER SUPPLY IMPROVEMENT - $1,130,000
(SWC Project No. 2050LIN)

The city of Lincoln submitted a cost-share request for pre-construction and construction costs for 21,422 feet of 12-inch water transmission line to provide a second water supply, from a different connection point to the city of Bismarck, thereby creating redundancy to maintain fire flows and for domestic water supply. The existing 12-inch water main from the city of Bismarck is currently the sole supply to the community and is incapable of delivering a sufficient water supply. City intends to complete final design in 2018 with construction in 2019. The estimated cost is $1,947,024 with $152,857 for pre-construction costs and $1,794,167 for construction costs. Cost-share of 35 percent on pre-construction costs and 60 percent on construction costs provides total funding of $1,130,000. The Cost-Share Request Form and supporting material is attached as **APPENDIX B**.

It was the recommendation of Secretary Erbele that the State Water Commission approve the total cost-share of $1,130,000, with pre-construction costs funded at 35 percent and construction costs funded at 60 percent, for the city of Lincoln Water System Improvement Project. The funding is in the form of cost-share towards eligible costs and contingent on available funding.

> **It was moved by Commissioner Goehring and seconded by Commissioner Zimmerman that the State Water Commission approve total state cost-share of $1,130,000, paid on eligible costs for 35 percent pre-construction costs and 60 percent construction costs. This action is contingent upon the availability of funds.**
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> **Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Pedersen, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Governor Burgum announced the motion unanimously carried.**

WILLISTON WATER SYSTEM IMPROVEMENTS - $2,336,000
SWC Project No. 2050WLL

The city of Williston submitted a cost-share request for pre-construction and construction costs for water system improvements. The request included construction of 9th Avenue E Watermain Project to improve water service to the area north of 26th street with an estimated cost of $424,375. A second project is for construction of 18th Street Watermain Project to improve water service to the area and the newly constructed east reservoir and pump station with an estimated cost of $3,600,417. The City intends to complete design in 2018 and start construction in 2019. The estimated total cost is $4,024,792. Cost-share of 35 percent on pre-construction costs and 60

percent on construction costs provides total funding of $2,336,000. A table summarizing the overall funding, the Cost-Share Request Forms and supporting material, is attached as **APPENDIX C**.

It was the recommendation of Secretary Erbele that the State Water Commission approve cost-share of $2,336,000, with pre-construction costs funded at 35 percent and construction costs funded at 60 percent, for Williston water system improvements. The funding is in the form of cost-share towards eligible costs and contingent on available funding.

> **It was moved by Commissioner Goehring and seconded by Commissioner Owan that the State Water Commission approve total state cost-share of $2,336,000, paid on eligible costs for 35 percent pre-construction costs and 60 percent construction costs. This action is contingent upon the availability of funds.**
>
> **Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Pedersen, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Governor Burgum announced the motion unanimously carried.**

VALLEY CITY MEMBRANE REPLACEMENT - $338,550
SWC Project No. 2050VAL

The State Water Commission received a cost-share request of $874,000 from the city of Valley City for the cost of modifications to their water treatment plant, because the current process cannot handle the raw water quality resulting in a shorter than predicted membrane life. The City withdraws water from a combination of sources using the Sheyenne River and a groundwater source directly connected to the river. In 2012 the City replaced their conventional lime softening treatment plant facility with ultra-filtration (UF) and Reverse Osmosis (RO) treatment which provides the City with significant higher quality water than the previous plant. The membrane brine concentrates could not be discharged into the Sheyenne River during certain times of the year, so a storage pond was constructed to store brine concentrate until river flows allow discharges without exceeding water quality discharge standards.

The final cost of the 2012 membrane treatment system was $21 million with a water treatment plant cost of $12.1 million, brine storage of $5.1 million, and engineering of $3.8 million. The State Water Commission cost-share was $15.4 million or 73 percent. The funding received from the American Recovery and Reinvestment Act of 2009 (ARRA) and State and Tribal Assistance Grant reduced the local share to 10 percent. The funding sources are listed in the following table.

Source	Amount
ARRA State Revolving Loan Fund (SRF)	$ 2,046,000
ARRA SRF Loan Forgiveness	$ 2,600,000
State and Tribal Assistance Grant	$ 776,000
SWC Cost-share (Water Treatment Plant)	$ 9,200,000
SWC Cost-share (Water Treatment Plant)	$ 1,186,800
SWC Cost-share (Brine Storage)	$ 5,000,000
Valley City	$ 191,200
Total	$21,000,000

The City asserts that the presence of Devils Lake water in the Sheyenne River has resulted in a substantial cost increase and physical damage to the City's water treatment plant membranes. Starting two years ago, a study was generated by the City because of the fouling and associated increase in operational cost of the UF system in the new plant. The conclusion of their engineer's study is that the current water does not have the same quality as the water used in the pilot study and is now irreversibly fouling the UF system associated with the new water treatment plant. The City deleted a baffled pretreatment system in the original design to reduce costs based on the engineer's pilot study indicating this level of pretreatment was not needed. The City has proposed the following design correction and replacement to reduce organic and inorganic fouling with a 100 percent cost-share request of $874,000.

1. Purchase one new UF train (144 membrane modules) from the total of four trains with the remaining three trains being after the City verifies that the pretreatment modifications and maintenance cleanings are working. Cost of $378,000.

2. Plumbing of the RO water to soak the UF filters during off production times. Cost of $75,000.

3. Pretreatment modification to the plant to remove unwanted contaminants before the water enters the UF filters. Cost of $110,000.

4. Miscellaneous costs including 15 percent contingencies, design engineering, construction engineering, field instrument and control, warranty engineering, legal, and administration. Cost of $107,000.

5. Cost to the City for this failure of the UF system. Cost of $204,000.

The City plans to utilize the enhanced pretreatment and cleaning routines for six months to one year to study if the changes to the process and cleaning routines control organic and inorganic fouling as desired while monitoring the new membranes. At the end of the study period, the process will be adjusted, and the City intends to make cost-share request to purchase 432 membrane modules to replace the used modules in the

remaining three treatment trains. The replacement cost of the remainder of the membrane modules is estimated to be about $953,200 in 2018 dollars.

The following table provides a breakdown of the recommended cost-share. The recommendation is to provide 90 percent for construction of the pretreatment and RO permeate plumbing, which is similar to the original cost-share the City received from various sources of state and federal funding, although the SWC participation would increase from 73 percent to 90 percent.

The replacement of the filter modules is largely a maintenance expense, and as such would be ineligible by policy. The original agreement for the construction of the plant was clear in its language that the City is responsible for operating and maintaining the system in order to protect the state's investment. However, in recognition of the potential impacts from Devils Lake releases, the recommendation is a 60 percent cost-share (in accordance with our policy for municipal improvements) discounted by 50 percent due to the fact that the existing filters have already served the City for one half of their reasonable expected life.

The City has also requested 100 percent cost-share for what they believe are additional chemical, labor, and engineering expenses incurred to date. Secretary Erbele did not recommend cost-share on those items because they are operation and maintenance costs and are ineligible by policy. The City's initial cover letter, Cost-Share Request Form, and supporting material are attached as **APPENDIX D.**

It was the recommendation of Secretary Erbele that the State Water Commission approve total cost-share of $338,550 as shown in the following table for the city of Valley City Membrane Replacement Project. The funding is in the form of cost-share towards eligible costs and contingent on available funding.

After review and Commission discussion, it was determined that miscellaneous administrative and legal fees ($9,250), and UF operation costs ($204,000), would not be considered eligible costs and cost-share would be at 90 percent. The remaining eligible costs are $651,500 with 90 percent cost-share of $586,350.

Item	Cost	%	Cost-Share	Local Cost
Pre-Treatment Modifications	$110,000	90	$99,000	$11,000
RO permeate to UF filter plumbing	$75,000	90	$67,500	$7,500
One membrane module purchase (50% life @ 60%)	$378,000	60	$113,400	$264,600
Misc: design engineering	$25,000	60	$15,000	$10,000
Misc: construction engineering	$45,000	60	$27,000	$18,000
Misc: contingencies 10%	$18,500	90	$16,650	$1,850
Misc: admin and legal 5%	$9,250	0	$ 0	$9,250
UF Operations Cost	$204,000	0	$ 0	$204,000
Total	$864,750		$338,550	$526,200

It was moved by Commissioner Goehring and seconded by Commissioner Owan that the State Water Commission approve total state cost-share of $586,350, with eligible costs funded at 90 percent. This action is contingent upon the availability of funds.

Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Commissioner Pedersen abstained from voting. Governor Burgum announced the motion unanimously carried.

FEDERAL MUNICIPAL, RURAL, AND INDUSTRIAL WATER SUPPLY FUNDING:

SOUTH CENTRAL REGIONAL WATER DISTRICT PHASE 5 - $495,000 (SWC Project Nos. 237-03; 237-03NOE; 1736-99; 237-03SOU

The 2017 Federal Municipal, Rural, and Industrial Water Supply (MR&I) budget changed from an estimated $10 million to a final budget of $9 million. This request is to reduce the Southwest Pipeline Project funding, provide additional funding for South Central Regional Water System Phase 5 Project, and account for MR&I program administration. The Garrison Diversion Conservancy District approved this request at their October 12, 2017, meeting.

South Central Regional Water District Expansion Project – South Central is developing a regional water system to serve Emmons, Logan, McIntosh, and Kidder Counties with the water supply from the Emmons water treatment plant near Linton. South Central is requesting additional funding to add a booster station in Phase 5 due to the water users going from 329 to 500. The previous estimated expansion cost was $12,500,000 with approval of a 75 percent grant of $9,375,000. The new expansion cost estimate is $13,160,000, and a 75 percent grant of $9,870,000 requires an additional $495,000. The following table shows the recommended funding modifications. The original cover letter, application, and supporting material are attached as **APPENDIX E.**

Project	Previous	Recommended
Northeast Regional Water District	$6,000,000	$6,000,000
South Central Regional Water District	$ 0	$ 495,000
Southwest Pipeline Project	$4,000,000	$2,300,000
Administration	$ 0	$ 205,000
Total	**$10,000,000**	**$9,000,000**

It was the recommendation of Secretary Erbele that the State Water Commission approve the 2017 Federal MR&I budget and grant an additional $495,000 to South Central Regional Water District for the Expansion Project. The funding is in the form of a grant towards eligible costs, contingent on available funding, subject to future revisions, and the project following the Federal MR&I program requirements.

It was moved by Commissioner Pedersen and seconded by Commissioner Zimmerman that the State Water Commission approve the 2017 Federal MR&I budget and grant an additional $495,000 to South Central Regional Water District for the Expansion Project. The funding is in the form of a grant towards eligible costs, contingent on available funding, subject to future revisions, and the project following the Federal MR&I program requirements.

Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Pedersen, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Governor Burgum announced the motion unanimously carried.

FIVE-YEAR PLAN 2018-2022

The attached Garrison Diversion Unit State Municipal, Rural, and Industrial Water Supply (MR&I) Program Five-Year Plan for fiscal years 2018 to 2022 is used to address variations in appropriations and priorities and is submitted to the Bureau of Reclamation for their use in estimating the State's capacity to expend funding attached as **APPENDIX F**. The table shows total federal funding need of $184.4 million and local funding need of $47.6 million with estimates for each year of the plan. The federal funding is only an estimate and actual funding is dependent on annual congressional appropriations. The remaining MR&I funding authorization is approximately $130 million but is indexed as necessary to allow for ordinary fluctuations of construction costs incurred after the date of enactment of the Dakota Water Resources Act of 2000.

The Northwest Area Water Supply (NAWS) Project is projected to receive the major funding. All Seasons Water Users District Project is a rural water expansion project to serve over 1,200 new water users in Bottineau County, especially in the Northeastern corner, but requires the water service capacity being built into the NAWS project. **APPENDIX F** includes system maps for both projects. The Garrison Diversion Conservancy District received the plan at their January 12, 2018, meeting.

NORTHWEST AREA WATER SUPPLY PROJECT (NAWS):

CONTRACT 7-1B AWARD AND 2017-2019 BIENNIUM FUNDING - $26,868,000 (SWC Project No. 237-4)

A project update, bid process, and funding history was given by Tim Freije, NAWS Project Manager.

Project:
NAWS Contract 7-1B Minot Water Treatment Plant Phase II Improvements generally consists of construction of a new primary treatment building at the Minot water treatment facility to enable treatment of current and future groundwater and surface water sources. The building addition will house two 9 million gallons per day (MGD) solids contact basins with recarbonation, new chemical feed facilities and storage for lime, coagulant, polymer, and chlorine as well as a new laboratory, break room, and IT facilities. The purpose of this project is to replace the aging existing solids contact basins which date to the 1950s and 1960s and associated chemical feeds. The original plan had been to rehabilitate the existing basins in situ, rehabbing the existing 12 MGD basin while operating on the existing 6 MGD over the winter months and rehabbing the 6 MGD basin while operating on the new 12 MGD basin. This has not been an option for several years due to increased winter base flow demands in the area.

Bid Opening:
Bids were opened December 21, 2017. The bid package consisted of four bid contracts (general, mechanical, electrical, and combined) with two possible combinations of multiple primes or one combined bid prime bid. Since there was no prime bid submitted for bid contract 2 – mechanical, the contract will be awarded based on bid schedule 4 – combined prime bid. Four bids were received for contract 4 and are summarized below. Attached as **APPENDIX G** is the bid review opinion from Houston Engineering which includes its summarization. The bid from Swanberg Construction is considered non-responsive but is included for comparison.

Contractor	Total Contract Cost (with alternates)	Percent Greater than OPCC
PKG Contracting, Inc.	$26,868,000.00	4.4%
Rice Lake Construction	$28,603,978.05	11.2%
Swanberg Construction	$29,916,876.00	16.3%
John T. Jones Construction	$33,698,100.00	31.0%
Engineer's OPCC	$25,725,555.00	

Bid Alternates:
Eight bid alternates were included in the contract primarily to promote competition for multiple project components which might otherwise have been essentially sole-sourced. Bid alternates A-1 and A-4 were additive alternates for sod instead of hydro-seeding, a protective coating/insulation for process piping versus conventional pipe coating, and adhesive insulation in the base bids. Neither alternate provided adequate advantage

over the base bid to justify the additional expense, therefore, were not recommended for award.

Bid alternates A-2 and A-3 were for a urethane insulated carbon dioxide storage tank and a vacuum-jacketed insulated carbon dioxide storage tank, respectively. Bid alternate A-3 was $52,000 higher than A-2, but a life cycle analysis showed a lower overall cost for the vacuum jacketed alternate. There will also likely be additional savings available for the vacuum jacketed tank. The vacuum jacketed tank will likely require less refrigeration capacity and can utilize a lesser pipe schedule for the stainless-steel piping which is enclosed in the vacuum jacket and exposed on a urethane insulated tank. Anticipated savings could all but eliminate the cost difference between these two alternates which would make the life cycle costs much better for bid alternate A-3. For these reasons, the recommendation would be to award the contract with bid alternate A-3.

Bid alternates A-5 and A-6 were for Reaction turbines and Francis turbines, respectively, to dissipate excess pressure from the Sundre/NAWS supply line and recover electricity in the process. The supply line from the Sundre aquifer is being rerouted from the original fiberglass pipeline through the city of Minot to a line that ties into the NAWS raw water line south of Minot along highway 83 to avoid impacts from the enhanced Mouse River flood protection and to replace aging/high maintenance infrastructure. The point of the tie-in is at an elevation of roughly 1,795 ft msl, whereas the treatment plant sits at about 1,580 ft msl. This results in excess pressure that needs to be bled off, and rather than using a pressure reducing valve, the plan is to utilize the excess pressure to generate electrical power via a turbine. The payback period on this is 10 to 11 years. It was anticipated the Francis turbines will have a higher capital cost and a lower operating and programming costs. The Reaction turbines can produce a higher efficiency, but only for a very narrow flow range. The Francis turbines handle variable flow much better and therefore provide a higher overall efficiency, simpler piping, and programming. The water treatment facility will be roughly energy neutral based on historic electrical use and project water demands, and will result in lower overall water cost to users. For these reasons, the recommendation is to award the contract with bid alternate A-6.

Bid alternates A-7 and A-8 were for RDP and Merrick lime slakers, respectively. Lime slaking is the process in which calcium oxide (CaO), referred to as quick lime or pebble lime, is converted into calcium hydroxide ($Ca(OH)_2$) which is referred to as hydrated lime and is the useful application for water treatment. The original design for this project was based on the RDP Tekken® lime slaker. This style of lime slaker is very popular as it offers greatly improved reliability and operational simplicity over traditional paste or detention style lime slakers. Merrick has introduced a competitor with similar specifications, so we bid them as alternates. These could not be bid as equals because they are not equal products. Both systems have advantages and disadvantages, but RDP has numerous installations of this specific type of slaker whereas this would be one of Merrick's first installations for this product. The city of Minot has a significant preference for the RDP system. Considering the pluses and minuses, for a critical

component of critical infrastructure, the additional expense for the RDP system is justified, and the recommendation is to award the contract with bid alternate A-7.

Bid Cost Analysis:
Bids were higher than the engineer's opinion of probable construction cost and early total project cost estimates. Numerous factors contributed to this aside from the general variability in bidding construction projects. Several features were modified or added to the project throughout the evolution of the design and after advertising through addenda. Laboratory, IT, restroom, and breakroom facilities were added to Phase II improvements to accommodate later Phase III improvements. This project adds significantly to the footprint of the facility, and the existing infrastructure will be rehabbed in Phase III and subject to considerable disruption during said efforts. The lab, IT, offices, etc. will need to be utilized for continued operation during Phase III, and it made more sense for construction sequencing and economically to incorporate these efforts into Phase II. The clarifier hardware was changed from coated carbon steel to stainless through addenda, as it results in a lower life cycle cost despite a higher capital cost. The engineer's estimate did not include a full load of chemicals for start-up and commissioning of the process equipment.

Additional Equipment Needed:
The recarbonation equipment was removed from this contract at the 90 percent design review, and will be procured through a separate procurement contract. This is being done to promote competitive bids rather than effectively sole-sourcing the equipment which would have resulted from including it in the bid. It will be a side-stream recarbonation system instead of having a recarb basin with baffles and diffusers.

Biennium Funding:
Approximately $12.5 million was carried over from the previous biennium for NAWS. The total projected project cost for Contract 7-1B is between $28.5 million and $29 million. Including roughly $5.5 million for the Biota Water Treatment plant design, agency operating costs, and legal costs associated with the NAWS appeal yields a biennium total of approximately $35 million. Less the city of Minot's 35 percent share, this leaves a State and Federal share of $22.5 to $23 million. An additional $10 million appropriation will be needed for the NAWS project from the 2017-2019 biennium funding.

It was the recommendation of Secretary Erbele that the State Water Commission authorize the award of NAWS Contract 7-1B to PKG Contracting, Inc., based on their Contract 4 bid in the amount of $26,868,000 including bid alternates A-3, A-6, and A-7, upon review of the bid documents by legal counsel and concurrence from the Garrison Diversion Conservancy District and the US Bureau of Reclamation. It was also the recommendation of Secretary Erbele that the State Water Commission obligate $10 million from the 2017-2019 State Water Commission budget to the NAWS project**.**

It was moved by Commissioner Goehring and seconded by Commissioner Zimmerman that the State Water Commission authorize 1) the award of NAWS Contract 7-1B to PKG Contracting, Inc., based on Contract 4 bid in the amount of $26,868,000 including bid alternates A-3, A-6, and A-7; and 2) obligate $10 million from the 2017-2019 State Water Commission budget to the NAWS project.

Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Pedersen, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Governor Burgum announced the motion unanimously carried.

DROUGHT DISASTER LIVESTOCK WATER SUPPLY PROGRAM – $500,000 (SWC Project No. 1851):

A program update was presented by Pat Fridgen, Director of Planning and Education. The State Water Commission reactivated the Drought Disaster Livestock Water Supply Program (Program) on June 23, 2017, in response to the severe drought impacting North Dakota livestock producers.

The Program provides 50 percent cost-share, up to $3,500 per project, with up to three projects per eligible livestock producer, for financial assistance to develop long-term and reliable water supply sources that can mitigate water shortages caused by drought.

The Program has received $1.525 million in funding from the Commission, and those funds have been approved for 505 eligible projects, involving 358 producers.

Drought conditions have not appreciably improved throughout the state, and new requests for financial assistance through the Program continue to come in. Commission staff have been conditionally approving those applications, pending the allocation of additional funding by the Commission.

It was the recommendation of Secretary Erbele that the State Water Commission approve an additional $500,000 for the Program bringing the total funds to date to $2,025,000. This approval will be contingent on the availability of funds.

The administrative rules have been filed with Legislative Council and will be heard at the Administrative Rules Committee in March with an effective date of April 1, 2018. At the December 8, 2017, State Water Commission meeting, staff made a request to increase the project share to $4,500. This change needs to be presented during legislative session for statutory approval because the dollar amount is written in North Dakota Century Code. It was discussed that the dollar amount be left out of code in order to increase project amounts as needed and determined by the Commission.

It was moved by Commissioner Owan and seconded by Commissioner Goehring that the State Water Commission approve an additional $500,000 for the Program bringing the total funds to date to $2,025,000. This approval will be contingent on the availability of funds.

Commissioners Andersen, Anderson, Johnson, McDonald, Owan, Pedersen, Zimmerman, Goehring, and Governor Burgum voted aye. There were no nay votes. Governor Burgum announced the motion unanimously carried.

2019 STATE WATER DEVELOPMENT PLAN:

An update of ongoing water development efforts was presented by Pat Fridgen, Director of Planning and Education.

Background:
NDCC 61-02-01.3 requires that on a biennial basis, the State Water Commission *"develop and maintain a comprehensive water development plan organized on a river basin perspective, including an inventory of future water projects for budgeting and planning purposes."*

In compliance with this statutory requirement, the Planning and Education Division began the process of developing a 2019 Water Development Plan, focusing on the 2019-2021 biennium and beyond. To make this process a success, the agency sent inquiries to potential project sponsors from all across the state during the second week of January.

Potential project sponsors were asked for their help in identifying the water development projects they're trying to move forward, the timing of their implementation, and estimated costs. As in the past, the input gained from local project sponsors and water managers will become the foundation of the State Water Commission's budget request to the Governor and Legislature.

Looking Ahead:
Project sponsors were given a March 23, 2018, deadline to submit projects to the Commission. They are able to submit their information electronically through the State Water Commission's website, where it is compiled in an electronic database. After the submittal deadline has passed, the Commission will review all of the projects for potential eligibility, and assign each project a priority.

Ultimately, the project information that is submitted to the Commission is presented during Commissioner-hosted basin meetings around the state. The basin meetings are expected to be scheduled for the summer of 2018. Traditionally at those meetings, the Commission has asked sponsors to verify the project information they submitted, but

also, to present their project(s) to the Commission if they choose to do so. This type of meeting format provides Commission members with an opportunity to hear directly from project sponsors about their new and ongoing water development efforts. It also enables the agency to include the most accurate project information possible in the Water Development Plan to the water community, and the 2019 Legislative Assembly. It was clarified that additional projects and information can be added after the March 2018 deadline. The most recent information will be presented.

Blake Crosby, Executive Director, ND League of Cities, will be working with State Water Commission staff to send out a survey mechanism in order to compile an inventory and comprehensive list of aging municipal water supply infrastructure needs in North Dakota. The information will include projections out to 5, 10, 15, and 20 years.

PUBLIC COMMENT AND DISCUSSION ON REVISED COST-SHARE POLICY

Cost-Share:
Craig Odenbach, Director of Water Development Division, noted that draft revisions have been made to the Cost-Share Policy and placed on the State Water Commission website for public review and comment. Written comments will be received through April 2018, with additional comments to be heard at the April 12, 2018, Commission meeting.

Blake Crosby, Executive Director, ND League of Cities, requested more time to receive comments from stakeholders in order to present at the April 2018 meeting.

Lance Gaebe, Spokesman, ND Water Users and ND Water Resource Districts Association, also requested more time to receive comments from stakeholders. One suggestion brought forward by Lance was to categorize the project priority by the categories of water supply, flood control, and general management.

Gordon Johnson, Manager, Northeast Regional Water District, requested that costs of correcting pipeline water loss, replacement of glued jointed PVC waterlines, and cost of tools to monitor water lines such as meter pits and gate valves be considered as items eligible for cost-share assistance. The older water system pipelines were glued and are now breaking down and are very expensive to replace by repairing one joint after another. Of 333 million gallons pumped, almost 50 million gallons were pumped into the ground due water being lost through the broken pipelines. The systems that need to be replaced were installed beginning in the late 1960s through the early 1980s.

Neil Breidenbach, Manager, Grand Forks Traill Water District, reiterated the need for cost-share assistance for the replacement of leaking water pipelines. It currently costs approximately $200,000 per year to repair leaks and make repairs to the pipes. Grand Forks Traill Water District loses 37 percent of water pumped into their water pipelines which were installed beginning in 1971.

Governor Burgum requested data be compiled prior to the next meeting to show the start dates of the rural water systems throughout North Dakota.

Governance and Subcommittees:
Commissioner Andersen presented a proposal regarding the potential development of various subcommittees as well as a strategic planning proposal, attached as **APPENDIX H**.

Commissioner Andersen proposed the Governor and Commissioner Goehring would be invited to all subcommittee meetings, and all Commissioners would serve on two subcommittees, one large and one small committee. The proposed subcommittees would review funding requests and make recommendations to the full Commission. It was suggested that project sponsors be allowed to appear at subcommittee meetings to present their project application. The four subcommittees could be formulated based on the four categories of funding approved by the legislature.

Commissioner Andersen feels a strategic planning process would be helpful for future planning efforts.

Commissioner Goehring asked that the proposal be forwarded to our attorneys for review of the legalities, process, and liability. Commissioner Goehring was concerned about who would then make the formal recommendation to the Commission given statute dictates that this is the responsibility of the State Engineer.

Governor Burgum agreed that the recommendation would need legal review to be sure the governance plan is in compliance with law. Governor suggested the subcommittees could develop templates which would be used as checklists to ensure all items were reviewed prior to bringing forward to the full Committee meeting. Subcommittee meetings could be held telephonically, electronically, or through videoconferencing. Governor asked that the proposal be reviewed to possibly create rules in order to address more definitive intention and address the concerns of the Commissioners and prior to the next meeting.

It was decided that discussion and decisions about subcommittees would continue at future meeting. Secretary Erbele clarified that all subcommittees meeting would need to be noticed as public meetings and meeting minutes would need to be generated.

2017 NORTH DAKOTA WEATHER MODIFICATION PROJECT

At the August 2017 Hettinger County Commissioner's meeting, a group of concerned citizens from Hettinger County presented a "Petition to End Experimental and Ongoing Weather Modification Project."

In support of the petition, Jon Wert, from New England, North Dakota, presented information on the "Effects of Weather Modification," attached as **APPENDIX I.**

Jamie Kouba also presented information on the effects of weather modification in support of the petition.

Lance Gaebe, ND Weather Modification Association, indicated that a number of counties which utilize the weather modification cost-share funding appreciate and support the program. Producers from McKenzie, Ward, and Bowman counties wanted to express their support, but were unable to attend the full meeting. Mountrail County was unable to send a representative, but its Board of Commissioners and its County Weather Modification Authority prepared letters of support, copies of which are attached as **APPENDIX J**. The ND Weather Modification Association board will also provide additional information to supplement what was presented today.

Governor Burgum thanked Mr. Wert and Mr. Kouba for the handout and information. Because this is the first time many of the new Commissioners have been introduced to the weather modification program, Governor Burgum requested that the issue be placed on the agenda in the future so the Commissioners and staff can have a discussion on the budget and budget approaches. This will include how the money is spent; how county boards form a board to decide whether or not to have weather modification programs based on a local vote to proceed, and how the State Water Commission cost-shares with the counties for the cost of the program. This would include discussion on 1) how the counties decide on the program and funding locally; how this occurs with county votes and authorities; 2) State Water Commission funding of the Weather Modification Program; and, 3) the role of state government relevant to the governance at the local level.

The State Water Commission funds $700,000 of the $2.1 million expenditure.

PROJECT UPDATES

Jon Kelsch, Construction Section Chief for Devils Lake; Laura Ackerman, Investigations Section Chief; and Mary Masad, Manager/CEO, Southwest Water Authority, provided brief summary updates on the following projects: Devils Lake Outlet; Missouri River; Mouse River; and, Southwest Pipeline Project. The summary updates are attached as **APPENDIX K**.

The next scheduled meeting is scheduled for April 12, 2018.

Governor Burgum thanked the State Water Commission staff for their work and preparation of the material presented, and visitors that traveled from across the state for their attendance.

There being no further business to come before the State Water Commission, Governor Burgum adjourned the February 8, 2018, meeting at 5:25 p.m.

Doug Burgum, Governor
Chairman, State Water Commission

Garland Erbele, P.E.
North Dakota State Engineer,
and Chief Engineer-Secretary
to the State Water Commission

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 BIENNIUM

Appendix A

Dec-17

	BUDGET	SWC/SE APPROVED	EXPENDITURES	REMAINING UNOBLIGATED	REMAINING UNPAID
MUNICIPAL & REGIONAL WATER SUPPLY:					
MUNICIPAL WATER SUPPLY	90,013,609	90,013,609	10,119,586	0	79,894,023
RED RIVER VALLEY	30,000,000	17,000,000	2,000,000	13,000,000	15,000,000
OTHER REGIONAL WATER SUPPLY	86,541,296	86,541,296	19,191,659	0	67,349,638
UNOBLIGATED MUNICIPAL/REG WATER SUPPLY	28,614,050			28,614,050	
RURAL WATER SUPPLY:					
RURAL WATER SUPPLY	52,107,469	52,107,469	17,804,855	0	34,302,614
UNOBLIGATED RURAL WATER SUPPLY	16,467,145			16,467,145	
FLOOD CONTROL:					
FARGO	144,876,087	78,376,087	10,880,196	66,500,000	67,495,891
MOUSE RIVER	89,410,776	89,358,276	3,001,169	52,500	86,357,107
VALLEY CITY	14,607,634	14,607,634	0	0	14,607,634
LISBON	9,000,010	9,000,010	2,525,785	0	6,474,225
OTHER FLOOD CONTROL	35,830,517	35,830,517	2,061,601	0	33,768,916
PROPERTY ACQUISITIONS	20,422,133	20,422,133	10,654,535	0	9,767,598
WATER CONVEYANCE	18,502,433	18,502,433	1,366,599	0	17,135,834
UNOBLIGATED FLOOD CONTROL	5,632,858			5,632,858	
GENERAL WATER:					
GENERAL WATER	22,633,124	22,633,124	5,089,349	0	17,543,775
UNOBLIGATED GENERAL WATER	10,838,974			10,838,974	
REVOLVING LOAN FUND:					
GENERAL WATER PROJECTS	5,581,900	5,581,900	2,292,500	0	3,289,400
WATER SUPPLY	1,189,000	1,189,000	354,000	0	835,000
TOTALS	682,269,015	541,163,486	87,341,832	141,105,529	453,821,654

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium

WATER SUPPLY

Approved By	SWC No	Dept	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	Dec-17 Balance
			Municipal Water Supply:					
	2050-13	5000	Mandan	New Raw Water Intake	10/7/2013	1,515,672	27,658	1,488,014
	2050-15	5000	Washburn	New Raw Water Intake	10/7/2013	2,281,927	0	2,281,927
	2050-18	5000	Grafton	Water Treatment Plant Phase 3	10/7/2013	816,343	48,822	767,521
	2050-20	5000	Dickinson	Capital Infrastructure	10/6/2015	1,793,507	0	1,793,507
	2050-21	5000	Watford City	Capital Infrastructure	2/27/2014	536,627	1,617	535,010
	2050-26	5000	Fargo	Fargo Water System Regionalization Improvements	7/29/2015	4,131,788	541,905	3,589,883
	2050-28	5000	Mandan	Water Systems Improvement Project	10/6/2015	2,005,765	1,054,606	951,159
	2050-29	5000	Minot	Water Systems Improvement Project	10/6/2015	3,478,647	1,831,772	1,646,875
	2050-30	5000	Watford City	Water Systems Improvement Project	10/6/2015	5,374,639	248	5,374,391
	2050-31	5000	West Fargo	Water Systems Improvement Project	10/6/2015	1,086,602	0	1,086,602
	2050-32	5000	Williston	Water Systems Improvement Project	10/6/2015	7,857,010	0	7,857,010
	2050-36	5000	Dickinson	Water Systems Improvement Project	10/6/2015	674,881	0	674,881
	2050-37	5000	Dickinson	Dickinson State Avenue South Water Main	12/11/2015	963,920	0	963,920
	2050-44	5000	Beulah	Water Treatment Plant	3/9/2016	1,639,813	891,204	748,609
	2050-49	5000	Grand Forks	Grand Forks Water Treatment Plant	8/23/2017	50,645,520	5,721,753	44,923,766
	2050-51	5000	Mercer	Connect to McLean-Sheridan	8/23/2017	166,950	0	166,950
	2050-52	5000	New Town	Water Transmission Storage	8/23/2017	1,040,000	0	1,040,000
	2050-53	5000	West Fargo	Brooks Harbor Water Tower	8/23/2017	1,950,000	0	1,950,000
	2050-54	5000	West Fargo	North Loop Connection	8/23/2017	510,000	0	510,000
	2050-55	5000	West Fargo	West Loop Connection	8/23/2017	1,110,000	0	1,110,000
	2050-56	5000	Williston	US Highway 2 Water Main	8/23/2017	434,000	0	434,000
				TOTAL MUNICIPAL WATER SUPPLY		***90,013,609***	***10,119,586***	***79,894,023***
			Regional Water Supply:					
	1736-05	8000	SWPP	Southwest Pipeline Project	7/1/2013	44,988,408	11,743,374	33,245,034
	2374	9000	NAWS	Northwest Area Water Supply	7/1/2013	12,508,462	1,167,822	11,340,640
HB 1020	1973-02	5000	WAWSA	WAWSA	10/6/2015	155,603	95,960	59,643
	1973-05	5000	WAWSA	WAWSA	10/6/2015	8,888,823	4,317,938	4,570,885
	1973-06	5000	WAWSA	WAWSA	12/8/2017	20,000,000	1,866,564	18,133,436
	325-105	5000	RRVWSP	RRVWSP Garrison Diversion	8/23/2017	17,000,000	2,000,000	15,000,000
				TOTAL REGIONAL WATER SUPPLY		***103,541,296***	***21,191,659***	***82,349,638***
			Rural Water Supply:					
	2050-17	5000	Barnes Rural RWD	Improvements	3/11/2015	1,096,634	797,378	299,256
	2050-23	5000	Greater Ramsey WRD	SW Nelson County Expansion	8/23/2017	1,364,794	317,188	1,047,606
	2050-24	5000	All Seasons Water District	System 1 Well Field Expansion	9/15/2014	292,500	0	292,500
	2050-25	5000	All Seasons Water District	Bottineau County Extension, Phase I	7/29/2015	299,358	0	299,358
	2050-33	5000	Stutsman RWD	Phase V Storage & Pipeline Expansion Project	10/6/2015	1,172,760	452,587	720,173
	2050-34	5000	North Prairie RWD	Storage and Water Main	10/6/2015	1,968,086	423,490	1,544,596
	2050-35	5000	Southeast Water Users Dist	System Wide Expansion Feasibility Study	8/23/2017	13,159,145	3,129,938	10,029,207
	2050-38	5000	Dakota Rural Water District	Reservoir C Expansion	12/11/2015	90,841	13,284	77,557
	2050-39	5000	Missouri West Water System	Crown Butte Service Area Expansion Phase II	12/11/2015	161,906	0	161,906
	2050-41	5000	Northeast Regional WD	City of Devils Lake Water Supply Project	12/11/2015	12,789,020	9,815,515	2,973,505
	2050-42	5000	Walsh RWD	Phase 1 & 2 System Expansion	12/11/2015	1,639,753	603,292	1,036,461
	2050-43	5000	All Seasons Water District	System 4 Connection to System 1	12/11/2015	4,900,000	0	4,900,000
	2050-45	5000	Garrison Rural Water District	System Expansion Project	3/9/2016	1,731,110	1,150,106	581,004
	2050-50	5000	Grand Forks Traill RWD	Eastern Expansion & TRWD Interconnect Fesibility	8/23/2017	126,000	47,775	78,225
	2373-39	5000	North Central Rural Water Consortium	Carpio Berthold Phase 2	5/29/2014	2,425,167	338,605	2,086,563
	2373-41	5000	North Central Rural Water Consortium	Granville-Deering Area	10/24/2016	1,831,540	613,725	1,217,815
	2050-57	5000	North Central Regional Water District	Mountrail Expansion Phase II	8/23/2017	3,086,000	0	3,086,000
	2050-58	5000	North Central Regional Water District	Mountrail Co. Watery Phase III	8/23/2017	3,430,000	0	3,430,000
	2050-59	5000	Cass Rural Water District	Horace Storage Tank	8/23/2017	91,000	0	91,000
	2050-60	5000	North Prairie Rural District	Reservoir 9 Water Supply	8/23/2017	26,950	0	26,950
	2050-61	5000	North Prairie Rural District	Surrey/Silver Spring	8/23/2017	5,950	0	5,950
	2050-62	5000	Traill Rural District	Expansion/Interconnect	8/23/2017	150,880	101,972	48,908
	2050-63	5000	Walsh RWD	System Expansion Project	8/23/2017	57,375	0	57,375
	2050-64	5000	McLean-Sheridan Water District	Turtle Lake Water Tower	12/8/2017	107,450	0	107,450
	2050-65	5000	Tri-County Rural Water District	System Expansion Project	12/8/2017	103,250	0	103,250
				TOTAL RURAL WATER SUPPLY		***52,107,469***	***17,804,855***	***34,302,614***
				TOTAL		***245,662,373***	***49,116,099***	***196,546,274***

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium

FLOOD CONTROL

Approved By	SWC No	Dept	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	Dec-17 Balance
			Flood Control:					
SB 2020	1928-01	5000	Fargo	Fargo Flood Control Project	9/14/2014	20,001,131	10,880,196	9,120,935
SB 2020	1928-05	5000	Fargo Metro Flood Diversion	Fargo Metro Flood Diversion Authority 2015-2017	7/6/2016	58,374,956	0	58,374,956
	1771-01	5000	Grafton	Grafton Flood Control Project	10/12/2016	32,175,000	2,061,601	30,113,399
	1974-06	5000	Souris River Joint WRD	Development of 2011 Flood Inundation Maps	12/18/2015	1,522	0	1,522
	1974-09	5000	Souris River Joint WRD	Mouse River Flood Control Design Engineering	8/8/2016	96,696	71,267	25,428
	1974-11	5000	Souris River Joint WRD	Funding of 214 agreement between SRJB & USACE	12/5/2014	31,500	0	31,500
	1974-14	5000	Souris River Joint WRD	SIARR Program (Structure Acquisition, Relocation, or Ring Dike)	3/9/2016	5,895,975	1,278,468	4,617,507
	1974-15	5000	Souris River Joint WRD	Perkett Ditch Improvements	12/2/2016	404,593	188,310	216,283
	1974-16	5000	Souris River Joint WRD	Corps of Engineers Feasibility Study MREFPP	12/9/2016	355,546	12,537	343,009
	1974-18	5000	Souris River Joint WRD	Rural Reaches, Preliminary Engineering	10/12/2016	236,941	7,755	229,186
	1974-19	5000	Souris River Joint WRD	4th Avenue Tieback Levee & Burlington Levee - Design Engineerng	10/12/2016	2,463,340	1,006,523	1,456,817
	1974-20	5000	Souris River Joint WRD	Utility Relocations	10/12/2016	422,034	11,289	410,745
	1974-21	5000	Souris River Joint WRD	Highway 83 Bypass & Bridge Replacement	10/12/2016	1,983,623	300,270	1,683,353
	1974-22	5000	Souris River Joint WRD	Broadway Pump Station	3/29/2017	15,197,000	0	15,197,000
	1974-23	5000	Souris River Joint WRD	Peterson Coulee Outlet	3/29/2017	1,427,022	0	1,427,022
	1974-25	5000	Souris River Joint WRD	Flood Specific Emergency Action Plan for Ward Co.	7/20/2017	52,000	0	52,000
	1974-26	5000	Souris River Joint WRD	Phases MI-1, MI-2, MI-3 Construction	8/23/2017	60,465,734	0	60,465,734
	1974-27	5000	Souris River Joint WRD	Corps of Engineers Section 408 Review Through Section 2145	8/23/2017	74,750	74,750	0
	2122-01	5000	US Army Corps of Engineers	Development of Comprehensive Plan for Souris Basin	9/5/2017	250,000	50,000	200,000
	1344-04	5000	Valley City	Sheyenne River Valley Flood Control Project PHII	8/29/2016	58,414	0	58,414
	1504-01	5000	Valley City	Permanent Flood Protection Project	12/5/2014	477,445	0	477,445
	1504-03	5000	Valley City	Permanent Flood Protection PH III	12/9/2016	13,157,600	0	13,157,600
	1504-06	5000	Valley City	Permanent Flood Protection PH III & PH V	12/8/2017	914,175	0	914,175
SB 2371	1344-02	5000	Lisbon	Sheyenne River Valley Flood Control Project	8/8/2016	1,000,582	319,525	681,057
	1991-01	5000	Lisbon	Permanent Flood Protection Project	5/29/2014	146,969	0	146,969
	1991-03	5000	Lisbon	Permanent Flood Protection - Levee C Project	3/11/2015	377,799	2,160	375,639
	1991-06	5000	Lisbon	Permanent Flood Protection - Levee E Project	3/9/2016	84,125	52,000	32,125
	1991-08	5000	Lisbon	Permanent Flood Protection - Levee D Project	3/29/2017	3,590,535	2,152,100	1,438,435
	1991-10	5000	Lisbon	Permanent Flood Protection - Levee F Project	6/22/2017	3,800,000	0	3,800,000
	2079-01	5000	Williston	West Williston Flood Control	12/9/2016	3,655,517	0	3,655,517
				Subtotal Flood Control		***227,172,523***	***18,468,751***	***208,703,772***
			Floodway Property Acquisitions:					
	1993-05	5000	Minot	Minot Phase 2 - Floodway Acquisitions	12/8/2017	10,258,529	7,943,229	2,315,300
SB 2371	1523-05	5000	Ward County	Ward County Phase 1, 2 & 3 - Floodway Acquisitions	1/27/2012	6,015,347	995,445	5,019,902
SB 2371	1504-05	5000	Valley City	Valley City Phase 1 - Floodway Acquisitions	12/8/2017	3,406,947	1,521,080	1,885,867
SB 2371	2000-05	5000	Sawyer	Sawyer Phase 1 - Floodway Acquisitions	6/13/2012	135,844	0	135,844
	1991-05	5000	Lisbon	Lisbon - Floodway Acquisition	12/9/2016	603,300	194,780	408,520
	1987-05	5000	Burlington	Mouse River Enhanced Flood Plan Property Acquistion	5/10/2017	2,166	0	2,166
				Subtotal Floodway Property Acquisitions		***20,422,133***	***10,654,535***	***9,767,598***
				TOTAL FLOOD CONTROL		***247,594,656***	***29,123,286***	***218,471,370***
			Revolving Loan Fund:					
			(General Water)					
	2077	1050	Valley City	Valley City Flood Protection - Phase II Construction (LOAN)	12/9/2016	3,289,400	0	3,289,400
	2077-15	1050	Valley City	Valley City Pre Design & Eng & Phase III Buyouts (LOAN)	12/9/2016	1,392,500	1,392,500	0
	2077-14	1050	Lisbon	Permanent Flood Control	8/23/2017	900,000	900,000	0
			(Water Supply)					
	2077	1050	Barnes Rural Water District	Rural Expansion (LOAN)	10/12/2016	835,000	0	835,000
	2077-13	1050	North Central Rural Water Consortium II	Carpio Berhold Phase 2 (LOAN)	10/12/2016	215,000	215,000	0
	2077-12	1050	North Central Rural Water Consortium	Granville-Surrey-Deering Water Supply Project (LOAN)	10/12/2016	139,000	139,000	0
				REVOLVING LOAN TOTAL		***6,770,900***	***2,646,500***	***4,124,400***
				TOTAL		***254,365,556***	***31,769,786***	***222,595,770***

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium
Resources Trust Fund

WATER CONVEYANCE

Approved By	SWC No	Dept	Approved Biennum	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	*Dec-17* Balance
				Drain & Channel Improvement Projects:					
SWC	710	5000	2015-17	Maple River WRD	Upper Swan Creek Channel Improvement Project	10/6/2015	62,061	0	62,061
SWC	1056	5000	2015-17	Bottineau Co. WRD	Tacoma Bitz Legal Drain	7/6/2016	210,572	49,978	160,594
SE	1056	2000	2015-17	Bottineau Co. WRD	Stead Legal Drain	2/16/2017	14,738	7,369	7,369
SWC	1064	5000	2013-15	Rush River WRD	Cass County Drain No. 2 Channel Improvements Proj	3/11/2015	41,683	0	41,683
SWC	1070	5000	2015-17	Maple River WRD	Drain #14 Channel Improvements	3/29/2017	741,562	0	741,562
SWC	1071	5000	2015-17	Maple River WRD	Cass County Drain #15 Channel Improvements	3/9/2016	282,561	0	282,561
SWC	1088	5000	2015-17	Maple River WRD	Cass Drain #37 Channel Improvements	3/9/2016	215,157	0	215,157
SWC	1089	5000	2015-17	Maple River WRD	Cass County Drain #39 Channel Improvements	3/9/2016	210,568	0	210,568
SE	1180	5000	2015-17	Richland Co WRD	Legal Drain No. 7 Channel Improvements	5/11/2017	24,926	0	24,926
SWC	1101	5000	2011-13	Dickey Co. WRD	Yorktown-Maple Drainage Improvement Dist No. 3	11/1/2017	798,562	0	798,562
SE	1140	5000	2015-17	Pembina Co. WRD	Drain 11 Outlet Extension Cost Overrun Project	7/7/2015	5,088	0	5,088
SWC	1176	5000	2015-17	Richland Co. WRD	Legal Drain #2 Reconstruction/Extension Project	3/9/2016	224,231	28,549	195,682
SWC	1179	5000	2015-17	Richalnd Co. WRD	Legal Drain #5 (Lateral 27) Reconstruction	3/9/2016	180,353	0	180,353
SWC	1222	5000	2015-17	Sargent Co WRD	Drain No 11 Channel Improvements	10/12/2016	1,378,376	0	1,378,376
SWC	1227	5000	2011-13	Traill Co. WRD	Mergenthal Drain No. 5 Reconstruction	9/15/2014	12,225	0	12,225
SWC	1231	5000	2015-17	Traill Co. WRD	Carson Drain No. 10 Channel Improvements	10/12/2016	141,322	102,966	38,356
SWC	1236	5000	2015-17	Traill Co. WRD	Murray Drain No. 17 Channel Improvements	10/12/2016	127,759	45,812	81,947
SWC	1311	5000	2015-17	Traill Co. WRD	Buxton Township Improvement District No. 68	3/9/2016	110,418	61,348	49,070
SWC	1314	5000	2015-17	Wells Co. WRD	Hurdsfield Legal Drain	3/29/2017	644,292	0	644,292
SE	1328	5000	2015-17	North Cass Co. WRD	Drain No. 23 Channel Improv Preliminary Engineering	9/30/2015	921	0	921
SWC	1328	5000	2015-17	North Cass Co. WRD	Drain #23 Channel Improvements	3/9/2016	81,612	0	81,612
SWC	1331	5000	2015-17	Richland Co WRD	Drain #14 Reconstruction	12/9/2016	252,738	138,492	114,246
SWC	1486	5000	2015-17	Griggs Co. WRD	Thompson Bridge Outlet No. 4 Project	10/6/2015	621,661	0	621,661
SWC	1520	5000	2015-17	Walsh Co. WRD	Walsh County Drain 30-1	3/29/2017	282,307	152,734	129,573
SWC	1520	5000	2015-17	Walsh Co. WRD	Drain 87/McLeod Drain	3/29/2017	5,273,586	0	5,273,586
SWC	1951	5000	2015-17	Maple River WRD	Lynchburg Channel Improvements	7/6/2016	1,131,338	0	1,131,338
SWC	1951	5000	2015-17	Maple River WRD	Lynchburg Channel Improvements	7/6/2016	23,412	0	23,412
SWC	1975	5000	2015-17	Walsh Co. WRD	Drain 31-1	10/12/2016	111,543	0	111,543
SWC	1977	5000	2011-13	Dickey-Sargent Co WRD	Jackson Township Improvement Dist. #1	5/20/2015	447,653	0	447,653
SE	1978	5000	2015-17	Richland-Sargent Joint WRD	RS Legal Dam #1 - Pre-Construction Engineering	10/24/2016	13,680	0	13,680
SWC	1978	5000	2015-17	Richland-Sargent Joint WRD	RS Legal Drain #1 Extension & Channel Improvement	3/29/2017	378,000	0	378,000
SWC	1990	5000	2011-13	Mercer Co. WRD	Lake Shore Estates High Flow Diversion Project	3/7/2012	43,821	0	43,821
SE	2016	5000	2015-17	Pembina Co. WRD	Establishment of Pembina County Drain No. 80	4/10/2017	74,965	0	74,965
SWC	2049	5000	2015-17	Grand Forks Co. WRD	Grand Forks Legal Drain No. 58	3/29/2017	1,481,850	0	1,481,850
SWC	2062	5000	2015-17	Traill Co. WRD	Traill Co. Drain #64	7/6/2016	19,549	13,729	5,820
SWC	2068	5000	2015-17	Traill Co. WRD	Stavanger-Belmont Drain No. 52 Channel Impr	10/12/2016	414,652	271,004	143,648
SWC	2080	5000	2015-17	Walsh Co. WRD	Sam Berg Coulee Drain	10/12/2016	182,775	32,488	150,287
SWC	2081	5000	2015-17	Walsh Co. WRD	Drain #70	10/12/2016	562,429	360,406	202,023
SWC	2088	5000	2015-17	Pembina Co. WRD	Drain No. 79	12/9/2016	875,428	0	875,428
SWC	2108	5000	2015-17	Walsh Co. WRD	Walsh Co Drain #22	6/22/2017	266,086	0	266,086
SE	2112	5000	2017-19	Pembina Co. WRD	Pembina Co Drain #81	7/30/2017	56,000	0	56,000
SE	2093/1427	5000	2015-17	Bottineau Co. WRD	Moen Legal Drain	9/6/2016	18,542	0	18,542
				Snagging & Clearing Projects:					
SWC	568	5000	2015-17	Southeast Cass WRD	Sheyenne River Snagging & Clearing Reaches I,II,III	12/9/2016	150,073	0	150,073
SE	662	5000	2015-17	Walsh Co. WRD	Park River Snagging & Clearing	2/17/2017	51,435	0	51,435
SE	1287	5000	2013-15	McHenry Co. WRD	Souris River Snagging & Clearing Project	2/3/2015	10,500	0	10,500
SE	1667	5000	2015-17	Traill Co. WRD	Goose River Snagging & Clearing	6/21/2017	47,500	0	47,500
SE	1934	5000	2015-17	Traill Co. WRD	Elm River Snagging & Clearing	6/21/2017	47,500	0	47,500
SE	2095	5000	2015-17	Nelson Co WRD	Sheyenne River Snagging & Clearing	4/10/2017	19,700	0	19,700
SE	2110	5000	2015-17	Ward Co. WRD	Meadowbrook Snagging & Clearing	6/21/2017	33,000	0	33,000
					TOTAL		18,400,710	1,264,876	17,135,834

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium
Resources Trust Fund

COMPLETED WATER CONVEYANCE

Approved By	SWC No	Dept	Approved Biennum	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	*Dec-17* Balance
SWC	568	5000	2013-15	Southeast Cass WRD	Sheyenne River Reaches Snagging & Clearing Project	12/5/2014	94,238	10,312	83,926
SWC	568	5000	2015-17	Southeast Cass WRD	Sheyenne River Snagging & Clearing Reaches II	12/11/2015	27,905	2,451	25,454
SWC	568	5000	2015-17	Southeast Cass WRD	Sheyenne River Snagging & Clearing Reaches I	12/11/2015	73,902	0	73,902
SWC	568	5000	2015-17	Southeast Cass WRD	Sheyenne River Snagging & Clearing Reaches III	12/11/2015	87,035	0	87,035
SE	571	5000	2013-15	Oak Creek WRD	Oak Creek Snagging & Clearing Project	3/30/2015	1,107	0	1,107
SWC	1891	5000	2015-17	Steele Co WRD	Drain No. 8 Channel Improvement	7/6/2016	2,599	2,599	0
SWC	2042	5000	2015-17	Bottineau Co. WRD	Haas Coulee Legal Drain Phase II	6/22/2017	86,361	86,361	0
					TOTAL		373,147	101,723	271,424

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium
Resources Trust Fund

GENERAL PROJECTS

Approved By	SWC No	Dept	Approved Biennum	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	Dec-17 Balance
				Hydrologic Investigations:					
SE	1400	3000	2015-17	Fireside Office Solutions	Document Conversion (Water Permit Scanning)	8/23/2016	18,467	18,467	0
SE	989	3000	2017-19	ND Dept of Health	Water Sampling Testing	9/25/2017	52,750	52,750	0
SWC	2041	3000	2017-19	USGS	Stream Gage Joint Funding Agreement	12/8/2017	553,790	0	553,790
					Subtotal Hydrologic Investigations		***625,007***	***71,217***	***553,790***
				Devils Lake Basin Development:					
SWC	416-10	4700	2015-17	Operations	Devils Lake Outlet Operations	3/9/2016	10,027,973	2,341,356	7,686,617
SE	416-01	5000	2017-19	Devils Lake Basin Joint WRB	Board Manager	6/14/2017	60,000	0	60,000
					Subtotal Devils Lake Basin Development		***10,087,973***	***2,341,356***	***7,746,617***
				General Water Management:					
SE	274	5000	2015-17	City of Neche	Neche Levee Certification Project	3/21/2016	54,000	0	54,000
SWC	346	5000	2015-17	Williams County WRD	Epping Dam Spillway Reconstruction	3/29/2017	19,499	0	19,499
SWC	347	5000	2009-11	City of Velva	City of Velva's Flood Control Levee System Certificati	3/28/2011	32,497	0	32,497
SE	390	5000	2015-17	Logan County WRD	Beaver Lake Dam Rehabilitation Feasibility Study	6/8/2016	16,076	0	16,076
SE	394	5000	2015-17	Golden Valley Co WRD	Odland Dam Rehabilitiation Feasibility Study	10/13/2016	13,220	9,528	3,692
SE	399	5000	2013-15	Barnes Co WRD	Kathryn Dam Feasibility Study	9/19/2014	12,742	0	12,742
SE	420	5000	2015-17	Hettinger Park Board	Mirror Lake Dam Emergency Action Plan	12/2/2016	24,400	12,827	11,573
SE	460	5000	2015-17	Griggs Co. WRD	Ueland Dam Rehabilitation Feasibility Study	5/20/2016	17,500	0	17,500
SE	477	5000	2015-17	Valley City	Mill Dam Rehabilitation Feasibilty Study	6/8/2016	15,073	0	15,073
SE	479	5000	2017-19	Morton Co Parks & Recreation	Fish Creek Dam Rehabilitiation	10/4/2017	56,000	0	56,000
SE	512	5000	2015-17	Emmons County WRD	Nieuwsma Dam Emergency Action Plan	11/28/2016	7,532	812	6,720
SE	531	5000	2015-17	Benson Co WRD	Bouret Dam Rehabilitiation Feasibilitly Study	10/11/2016	12,118	0	12,118
SWC	551	5000	2015-17	McHenry Co. WRD	Buffalo Lodge Lake Outlet	6/22/2017	134,915	0	134,915
SE	561	5000	2015-17	City of Tioga	Tioga Dam EAP	5/20/2016	40,000	0	40,000
SWC	620	5000	2007-09	Lower Heart WRD	Mandan Flood Control Protective Works (Levee)	6/22/2017	15,000	0	15,000
SE	667	5000	2017-19	Burke Co WRD	Northgate Dam 2 Emergency Action Plan	9/5/2017	26,396	0	26,396
SE	841	5000	2013-15	Maple River WRD	Garsteig Dam Repair Project	1/26/2015	18,661	0	18,661
SE	848	5000	2015-17	Sargent Co WRD	Tewaukon WS-T-1-A (Brummond-Lubke) Dam EAP	12/18/2015	12,016	0	12,016
SE	848	5000	2015-17	Sargent Co WRD	Tewaukon WS-T-7 (Nelson) Dam EAP	12/18/2015	12,180	0	12,180
SE	849	5000	2015-17	Pembina Co. WRD	Renwick Dam Emergency Action Plan	9/29/2015	2,212	0	2,212
SWC	980	5000	2015-17	Cass Co. Joint WRD	Rush River Watershed Detention Study	1/7/2016	127,697	703	126,994
SWC	980	5000	2013-15	Cass Co. Joint WRD	Swan Creek Watershed Detention Study PHII	3/11/2015	122,666	0	122,666
SWC	980	5000	2015-17	Cass Co. Joint WRD	Upper Maple River Watershed Detention Study	1/11/2016	128,039	9,967	118,072
SE	1264	5000	2013-15	Barnes Co WRD	Little Dam Repurposing Feasibility Study	6/17/2015	12,385	0	12,385
SE	1270	5000	2015-17	City of Wilton	Wilton Pond Dredging Recreation Project	12/29/2015	35,707	0	35,707
SWC	1273	5000	2015-17	City of Oakes	James River Bank Stabilization	12/11/2015	262,500	0	262,500
SE	1289	5000	2015-17	McKenzie Co. Weed Board	Control of Noxious Weeds on Sovereign Land	4/10/2017	44,010	11,378	32,632
SE	1296	5000	2013-15	Pembina Co. WRD	Bathgate-Hamilton & Carlisle Watershed Study	10/17/2013	6,726	0	6,726
SWC	1301	5000	2015-17	Richland Co. WRD	North Branch Antelope Creek NRCS Small Watershec	3/9/2016	113,400	0	113,400
SE	1303	5000	2013-15	Sargent Co WRD	Gwinner Dam Improvement Feasibility Study Program	4/17/2015	20,181	0	20,181
SWC	1303	5000	2015-17	Sargent Co WRD	Shortfoot Creek Watershed Planning Program	3/9/2016	109,047	0	109,047
SWC	1389	5000	2013-15	Bank of ND	BND AgPace Program	12/13/2013	170,365	40,000	130,365
SE	1396	5000	2017-19	USGS	Water Level Monitoring of Missouri River	9/7/2017	15,000	0	15,000
SWC	1401	5000	2015-17	Pembina Co. WRD	International Boundary Roadway Dike Pembina	7/20/2017	294,528	27,974	266,554
SE	1418	5000	2015-17	City of Bisbee	Big coulee Dam EAP	5/10/2017	11,320	0	11,320
SE	1444	5000	2015-17	City of Pembina	Flood Protection System Certification	4/19/2016	1,657	0	1,657
SE	1453	5000	2015-17	Hettinger County WRD	Karey Dam Rehabilitation Feasibility Study	5/23/2016	6,853	0	6,853
SE	1625	5000	2015-17	Carlson McCain, Inc.	Ordinary High Water Mark Delineations Left Bank of M	12/2/2016	2,000	0	2,000
SWC	1638	5000	2009-11	Mutiple	Red River Basin Non-NRCS Rural/Farmstead Ring Di	6/23/2009	177,864	0	177,864
SWC	1705	5000	2011-13	Red River Joint Water Resour	Red River Joint WRD Watershed Feasibility Study - PI	9/21/2011	19,218	0	19,218
SE	1808	5000	2015-17	Steele Co WRD	Beaver Creek Dam Safety Inspection	5/23/2016	2,625	0	2,625
SWC	1851-01	5000	2015-17	ND State Water Commission	Drought Disaster Livestock Water Supply Assistance	12/8/2017	1,525,000	715,959	809,041
SWC	1859	5000	2017-15	ND Dept of Health	NPS Pollution	8/23/2017	200,000	0	200,000
SWC	1932	5000	2015-17	Nelson Co. WRD	Michigan Spillway Rural Flood Assessment	3/9/2016	25,850	0	25,850
SWC	1968	5000	2013-15	Garrison Diversion	McClusky Canal Mile Marker 10 & 49 Irrigation Project	3/17/2014	51,614	0	51,614
SWC	1968	5000	2015-17	Garrison Diversion	MM 15 Irrigation Project	3/29/2017	321,781	226,424	95,357
SWC	1968	5000	2015-17	Garrison Diversion	MM 42L Irrigation Project	8/23/2017	937,207	0	937,207
SE	1974	5000	2015-17	USGS	Installation of 5 Rapid Deployment Gages in the Mous	3/23/2017	23,200	0	23,200
SWC	1991	5000	2013-15	City of Lisbon	Sheyenne Riverbank Stabilization Project	9/15/2014	47,768	0	47,768
SWC	2008	5000	2013-15	City of Mapleton	Recertification of Flood Control Levee System Project	3/17/2014	101,100	0	101,100
SE	2111	5000	2017-19	Maple River WRD	Davenport Flood Risk Reduction	7/20/2017	35,000	0	35,000
SE	2055	5000	2015-17	Red River Joint Water Resour	Lower Red Basin Regional Detention Study	7/17/2015	45,500	0	45,500
SE	2058	5000	2015-17	City of Grafton	Grafton Debris Removal Plan	4/10/2017	8,177	0	8,177
SWC	2059	5000	2015-17	Park River Joint WRD	North Branch Park River NRCS Watershed Study	10/6/2015	81,200	0	81,200
SWC	2060	5000	2015-17	Walsh Co. WRD	Forest River Watershed Study	4/10/2017	154,012	0	154,012
SWC	2065	5000	2015-17	Cass Co. Joint WRD	Lake Bertha Flood Control Project No. 75	3/9/2016	201,350	0	201,350
SWC	2066	5000	2015-17	Southeast Cass WRD	Sheyenne-Maple Flood Control Dist #1 Mitigation Impr	3/9/2016	169,201	0	169,201
SE	2070	5000	2015-17	Garrision Diversion Conservan	Mile Marker 42 Irrigation Project	5/20/2016	29,741	0	29,741
SE	2071	5000	2015-17	Foster County WRD	Alkali Lake High Water Feasibilitly Study	4/19/2016	4,830	0	4,830
SE	2072	5000	2015-17	Barnes Co WRD	Ten Mile Lake Flood Risk Reduction Project	6/8/2016	36,812	0	36,812
SWC	2073	5000	2015-17	Walsh Co. WRD	Oslo Area Ag Levee Feasibility Study	7/6/2016	71,701	45,349	26,352
SWC	2074	5000	2015-17	City of Wahpeton	Flood Control - Levee Certification	7/6/2016	247,500	0	247,500
SWC	2074	5000	2015-17	City of Wahpeton	Breakout Easements	7/6/2016	265,000	0	265,000
SWC	2074	5000	2015-17	City of Wahpeton	Toe Drain & Encroachment Project	7/6/2016	1,125,482	1,108,663	16,819
SWC	2075	5000	2015-17	Ward Co. WRD	Second Larson Coulee Detention Pond	7/6/2016	602,307	0	602,307
SE	2076	5000	2015-17	Elm River Joint WRD	Elm River Dam #1 Modification Study	7/6/2016	9,503	0	9,503
SE	2078	5000	2017-19	Southeast Cass WRD	Raymond-Mapleton Township Imp Dist #76	7/20/2017	3,043	0	3,043
SE	2079	5000	2015-17	City of Williston	West Williston Flood Control	10/24/2016	39,900	0	39,900
SWC	2083	5000	2015-17	Pembina Co. WRD	Herzog Dam Gate & Catwalk Retrofit - Construction	10/12/2016	114,632	0	114,632

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium
Resources Trust Fund

GENERAL PROJECTS

Approved By	SWC No	Dept	Approved Biennum	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	*Dec-17* Balance
SE	2085	5000	2015-17	Adams Co WRD	Orange Dam Rehabilitation Feasibility Study	10/13/2016	10,770	977	9,793
SE	2089	5000	2015-17	Maple River WRD	Tower Township Improvement District No. 77 Study	12/19/2016	28,175	0	28,175
SE	2090	5000	2015-17	International Water Institute	River Watch Program	1/12/2017	24,150	5,713	18,437
SE	2094	5000	2015-17	McLean Co WRD	Lower Buffalo Creek Flood Management Feasibility	6/7/2017	7,539	0	7,539
SWC	2096	5000	2015-17	Southeast Cass WRD	Sheyenne-Maple Flood Control Dist #2 Improvements	3/29/2017	1,035,358	0	1,035,358
SWC	2107	5000	2015-17	City of Minot	Levee Repair & Bank Stabilization Project	6/22/2017	950,254	0	950,254
SE	2109	5000	2017-19	Logan County WRD	McKenna Lake Feasibility Study	6/21/2017	2,247	0	2,247
HB1020	2114	5000	2017-19	HDR Engineering	Economic Analysis-Flood Control & Conveyance Proje	12/28/2017	74,093	9,860	64,233
HB1020	2119	5000	2017-19	HDR Engineering	Life Cycle Cost Analysis Guidelines & Process Develo	12/28/2017	59,263	8,979	50,284
SE	1396-01	5000	2013-15	Trout, Raley, Montano, Witwer	Missouri River Recovery Program	11/17/2015	46,785	75	46,710
SE	1878-02	5000	2015-17	Maple-Steele Joint WRD	Upper Maple River Dam EAP	5/20/2016	12,800	0	12,800
SWC	849-01	5000	2015-17	Pembina Co. WRD	Tongue River NRCS Watershed Plan	3/9/2016	104,703	0	104,703
SE	AOC/IRA	5000	2017-19	ND Irrigation Association	Water Irrigation Funding	10/3/2017	50,000	50,000	0
SE	AOC/WRD	5000	2015-17	ND Water Resource Districts A	ND Water Managers Handbook	6/21/2017	24,750	15,876	8,874
SE	AOC/WEF	5000	2017-19	ND Water Education Foundatic	ND Water Magazine	8/2/2017	26,000	6,500	19,500
SWC	AOC/RRC	5000	2017-19	Red River Basin Commission	Red River Basin Commission Contractor	6/22/2017	200,000	0	200,000
SWC	AOC/ASS	5000	2017-19	Assiniboine River Basin Inititial	ARBI's Outreach Efforts	6/22/2017	100,000	0	100,000
SE	PS/WRD/UPP	5000	2017-19	Sheyenne River Joint WRB	USRJWB Operational Costs	6/20/2017	6,000	0	6,000
SE	AOC/MIS	5000	2017-19	Missouri River Advisory Counc	MRAC Startup Funding	8/3/2017	2,000	0	2,000
SE	PS/WRD/MRJ	5000	2017-19	Missouri River Joint WRB	MRRIC Terry Fleck	6/7/2017	45,000	0	45,000
SE	PS/WRD/MRJ	5000	2017-19	Missouri River Joint WRB	Board Operational Costs	6/7/2017	10,000	0	10,000
SWC	PS/WRD/ELM	5000	2013-15	Elm River Joint WRD	Dam #3 Safety Improvements Project	9/15/2014	5,672	0	5,672
SE	PS/WRD/LOW	5000	2015-17	Lower Heart WRD	Lower Heart Flood Contral	5/10/2017	21,140	0	21,140
					Subtotal General Projects		*11,550,933*	*2,307,565*	*9,243,369*
					TOTAL		22,263,913	4,720,137	17,543,775

STATE WATER COMMISSION
PROJECT SUMMARY
2017-2019 Biennium
Resources Trust Fund

COMPLETED GENERAL PROJECTS

Approved By	SWC No	Dept	Approved Biennum	Sponsor	Project	Initial Approved Date	Total Approved	Total Payments	*Dec-17* Balance
					Hydrologic Investigations:				
SE	1396	3000	2017-19	USGS	Maintain Gaging Station East of Lisbon Sheyenne River	9/25/2017	10,500	10,500	0
SWC	2041	3000	2015-17	USGS	Stream Gage Joint Funding Agreement	10/12/2016	136,028	136,028	0
					Subtotal Hydrologic Investigations		***146,528***	***146,528***	***0***
SWC	322	5000	2009-11	ND Water Education Fou	ND Water: A Century of Challenge	2/22/2010	36,800	35,000	1,800
SE	1303	5000	2015-17	Sargent Co WRD	Gwinner Dam Breach Project	2/20/2017	31,125	31,125	0
SWC	1523	5000	2015-17	Ward Co. WRD	Robinwood Bank Stabilization Project	10/6/2015	98,648	18,238	80,410
SE	1974	5000	2015-17	USGS	Regulated Streamflow Frequency for the Upper Souris River B	12/16/2016	12,367	12,367	0
HB1009	1986	5000	2017-19	ND Dept Agriculture	Wildlife Services 17-201	8/22/2017	125,000	125,000	0
SE	2069	5000	2015-17	Center Township	Wild Rice River Bank Stabilization	4/19/2016	954	954	0
					Subtotal General Projects		***304,894***	***222,684***	***82,210***
					TOTAL		451,422	369,212	82,210

SWC Date Received: 1/18/18

COST-SHARE REQUEST FORM

NORTH DAKOTA STATE WATER COMMISSION
DEVELOPMENT DIVISION
SFN 60439 (3/2017)

Appendix B

This form is to be filled out by the project or program sponsor with State Water Commission staff assistance as needed. Applications for cost-share are accepted at any time. However, applications received less than 30 days before a State Water Commission meeting will be held for consideration at the next scheduled meeting.

Please answer the following questions as completely as possible. Supporting documents such as maps, detailed cost estimates, and engineering reports should be attached to this form. If additional space is required, please use extra sheets as necessary.

For information regarding cost-share program eligibility see the *State Water Commission Cost-Share Policy, Procedure, and General Requirements* – available upon request or at www.swc.nd.gov.

Project, Program, Or Study Name
City of Lincoln 12" Water Supply Main

Sponsor(s)
City of Lincoln with support from the City of Bismarck

County	City	Township/Range/Section
Burleigh	Lincoln	

Description Of Request ☐ New ☑ Updated (previously submitted)

Specific Needs Addressed By The Project, Program, Or Study
Supply the City of Lincoln with redundant water supply and sufficient fire flow capability.

If Study, What Type ☐ Water Supply ☐ Hydrologic ☐ Floodplain Mgmt. ☐ Feasibility ☐ Other

If Project/Program

☐ Flood Control	☐ Multi-Purpose	☐ Bank Stabilization	☐ Dam Safety/EAP
☐ Recreation	☑ Water Supply	☐ Snagging & Clearing	☐ Property Acquisition
☐ Irrigation	☐ Water Retention	☐ Rural Flood Control	☐ Other

Jurisdictions/Stakeholders Involved
City of Lincoln, Burleigh County and City of Bismarck.

Description Of Problem Or Need And How Project Addresses That Problem Or Need
An existing 12" water supply from the City of Bismarck is currently the sole supply to the community and is incapable of delivering a sufficient water supply during the summer months. This project would provide a second water supply via a different connection point to the City of Bismarck, thereby creating redundancy to maintain fire flows and domestic water supply. The existing storage capacity of the City of Lincoln has less than 24 hours of available storage at peak flow rates and the existing feed is not capable of filling the storage tanks during summer months. The City was required to implement water restrictions in 2015, 2016, and 2017 for approximately 7 weeks during the summer. The proposed project will loop the supply allowing existing storage to maintain levels. During 2018, water modeling will take place in conjunction with design to determine if sufficient storage capacity exists with the second service line.

Has Feasibility Study Been Completed?	☐ Yes	☐ No	☐ Ongoing	☑ Not Applicable
Has Engineering Design Been Completed?	☐ Yes	☐ No	☑ Ongoing	☐ Not Applicable
Have Land Or Easements Been Acquired?	☐ Yes	☐ No	☑ Ongoing	☐ Not Applicable

Have You Applied For Any State Permits?	☐ Yes	☑ No	☐ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Applied For Any Local Permits?	☐ Yes	☑ No	☐ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			

Briefly Explain The Level Of Review The Project Or Program Has Undergone

The public review of the project is slated for 2018, but much public outcry was fielded during the water restrictions of 2015, 2016, and 2017.

Do You Expect Any Obstacles To Implementation (i.e., problems with land acquisition, permits, funding, local, opposition, environmental concerns, etc.)? No. Preliminary discussions with Burleigh County support a possible utility corridor within their ROW.

Funding Timeline (carefully consider when SWC cost-share will be needed)

Source	Total Cost	2015-2017 7/1/15-6/30/17	2017-2019 7/1/17-6/30/19	Beyond 7/1/19
Federal	$	$	$	$
State Water Commission	$ 1,170,000.00	$	$ 550,000.00	$ 620,000
Other State	$ 500,000.00	$	$ 500,000.00	$
Local	$ 280,000.00	$	$ 200,000.00	$ 80,000
Total	$ 1,950,000.00	$	$ 1,250,000.00	$ 700,000

List All Other State Of North Dakota Funding Sources (Grant or Loan), For Which You Have Applied

State Revolving Fund Drinking Water Loan

Please Explain Implementation Timelines, Considering All Phases And Their Current Status

Engineering design, permitting, easement acquisition and bidding will be completed in the 2017-2019 biennium and the project construction will be slated for the 2019 construction season and continue after the biennium end of 6-30-19. Completion of construction therefore will be in the next biennium.

Have Assessment Districts Been Formed? ☐ Yes ☐ No ☑ Ongoing ☐ Not Applicable

Submitted By Kenneth Nysether, P.E. - Short Elliot Hendrickson, Inc.			Date 11-07-2017
Address 4719 Shelburne St., Suite 6	City Bismarck	State North Dakota	ZIP Code 58503
Telephone Number 701-354-7121	Sponsor Email CityofLincoln@midconetwork.com	Engineer Email knysether@sehinc.com	

I Certify That, To The Best Of My Knowledge, The Provided Information Is True And Accurate.

Signature	Date 01-18-2018

MAIL TO:

ND State Water Commission • ATTN: Cost-Share Program
900 E Boulevard Ave. • Bismarck, ND 58505-0850

PRELIMINARY ESTIMATE

PROJECT NO.: **144551**
NAME: **City of Lincoln 12" Water Supply Main**
OWNER: **City of Lincoln**
DATE: **1/18/17**

ITE	QUANTITY	UNIT	DESCRIPTION	PRELIMINARY ESTIMATE UNIT COST	TOTAL
			BASE CONSTRUCTION		
GENERAL					
1	1.00	LS	MOBILIZATION	135,000	135,000
2	1.00	LS	BOND	68,000	68,000
			Subtotal		203,000
SITE ITEMS					
1	8,000.00	CY	TOPSOIL	4	32,000
2	1.00	LS	EROSION CONTROL	8,000	8,000
3	20.00	ACRE	SEEDING	700	14,000
4	50.00	TON	DRIVEWAY GRAVEL	45	2,250
WATER ITEMS					
1	1.00	LS	CONNECT TO EXISTING WATERMAIN	2,000	2,000
2	21422.00	LF	12" PVC C-900 WATER MAIN DR18	40	856,880
3	6.00	EA	12" GATE VALVE AND BOX	2,300	13,800
4	2654.00	LF	12" DIRECTIONAL BORE	50	132,700
	1921.00	LF	12" DIRECTIONAL BORE - APPROACH	50	96,050
5	210.00	LF	12" ENCASED BORE	100	21,000
6	5.00	EA	COMBINATION AIR VALVE (CAV) ASSEMBLIES	800	4,000
	5.00	EA	AIR RELEASE MANHOLE	5,500	27,500
7	1.00	EA	12" WATER METER	25,000	25,000
	5.00	EA	BLOWOFF ASSEMBLIES	3,000	15,000
8	4760.44	CY	GRANULAR BEDDING	20	95,209
			Subtotal		1,548,389

Contingencies (10%)	$154,839
Preliminary Construction Cost	$1,703,228
Construction Engineering	$90,939
Preliminary Total Construction Cost	$1,794,167
Pre Construction Engineering Design	$152,857
Preliminary Total Cost	$1,947,024

CITY OF LINCOLN

COUNTY OF BURLEIGH
STATE OF NORTH DAKOTA

PART OF SECTIONS 13 & 24
TOWNSHIP 138 NORTH, RANGE 80 WEST
AND
PART OF SECTIONS 7, 8, 17, 18, 19, & 20
TOWNSHIP 138 NORTH, RANGE 79 WEST

Extraterritorial Zoning Boundary Established January 24, 2012, by written agreement with the City of Bismarck.

HYDRANT #3056
* STATIC PRESSURE = 69 psi
* AVERAGE PRESSURE = 64 psi
* RESIDUAL FLOW = 4200 GAL/20psi
* TOP NUT ELEVATION = 1659.05
* GROUND ELEVATION = 1657.39
* GATE VALVE INV = 1640.50

LEGEND

WATERLINE

HYDRANT #3056

HIGHWAY 10

PROPOSED 12" METER LOCATION

16" WATERMAIN

CITY OF BISMARCK CORPORATE LIMITS

52ND STREET

66TH STREET

APPLE CREEK ROAD

12" WATERMAIN

CITY OF BISMARCK CORPORATE LIMITS

CITY OF LINCOLN EXTRA TERRITORIAL LIMITS

CITY OF LINCOLN CORPORATE LIMITS

CITY OF LINCOLN WATER TOWERS

SEH
PHONE: 701.354.7121
4719 SHELBURNE ST, SUITE 6
BISMARCK, ND 58503-5677
www.sehinc.com

State Water Supply Cost-Share Funding
Municipal Construction

Project	Pre-Construction			Construction			Total Cost-Share	Local Cost	Total Project Cost
	Cost	%	Cost-Share	Cost	%	Cost-Share			
Williston 9th Ave E Water Main	$34,500	35	$12,075	$389,875	60	$233,925	**$246,000**	$178,375	$424,375
Williston 18th St Water Main	$281,000	35	$98,350	$3,319,417	60	$1,991,650	**$2,090,000**	$1,510,417	$3,600,417
Total	$315,500		$110,425	$3,709,292		$2,225,575	**$2,336,000**	$1,688,792	$4,024,792

Appendix C

SWC Date Received : 11/8/17

COST-SHARE REQUEST FORM

NORTH DAKOTA STATE WATER COMMISSION
DEVELOPMENT DIVISION
SFN 60439 (3/2017)

This form is to be filled out by the project or program sponsor with State Water Commission staff assistance as needed. Applications for cost-share are accepted at any time. However, applications received less than 30 days before a State Water Commission meeting will be held for consideration at the next scheduled meeting.

Please answer the following questions as completely as possible. Supporting documents such as maps, detailed cost estimates, and engineering reports should be attached to this form. If additional space is required, please use extra sheets as necessary.

For information regarding cost-share program eligibility see the *State Water Commission Cost-Share Policy, Procedure, and General Requirements* – available upon request or at www.swc.nd.gov.

Project, Program, Or Study Name
9th Ave E Water Main

Sponsor(s)
City of Williston

County	City	Township/Range/Section
Williams	Williston	

Description Of Request ☑ New ☐ Updated (previously submitted)

Specific Needs Addressed By The Project, Program, Or Study

If Study, What Type ☑ Water Supply ☐ Hydrologic ☐ Floodplain Mgmt. ☐ Feasibility ☐ Other

If Project/Program

☐ Flood Control	☐ Multi-Purpose	☐ Bank Stabilization	☐ Dam Safety/EAP
☐ Recreation	☑ Water Supply	☐ Snagging & Clearing	☐ Property Acquisition
☐ Irrigation	☐ Water Retention	☐ Rural Flood Control	☐ Other

Jurisdictions/Stakeholders Involved
Williston, ND

Description Of Problem Or Need And How Project Addresses That Problem Or Need
Proposed improvements will close a gap in the existing standard municipal water supply service to the area north of 26th St. The addition of fire hydrants to an inherited rural water line in the neighborhood will greatly improve fire protection.

Has Feasibility Study Been Completed?	☐ Yes	☐ No	☑ Ongoing	☐ Not Applicable
Has Engineering Design Been Completed?	☐ Yes	☑ No	☐ Ongoing	☐ Not Applicable
Have Land Or Easements Been Acquired?	☐ Yes	☑ No	☐ Ongoing	☐ Not Applicable

Have You Applied For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Applied For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			

Briefly Explain The Level Of Review The Project Or Program Has Undergone

Project has been reviewed by the City Commission

Do You Expect Any Obstacles To Implementation (i.e., problems with land acquisition, permits, funding, local, opposition, environmental concerns, etc.)? No

Funding Timeline (carefully consider when SWC cost-share will be needed)

Source	Total Cost	2015-2017 7/1/15-6/30/17	2017-2019 7/1/17-6/30/19	Beyond 7/1/19
Federal	$	$	$	$
State Water Commission	$ 254,580	$	$ 254,580	$
Other State	$	$	$	$
Local	$ 168,720	$	$ 169,720	$
Total	$ 424,300	$	$ 424,300	$

List All Other State Of North Dakota Funding Sources (Grant or Loan), For Which You Have Applied

ND SWC, City of Williston

Please Explain Implementation Timelines, Considering All Phases And Their Current Status

Design - 2018, Construction - 2019, Completion - 2020

Have Assessment Districts Been Formed?	☐ Yes	☐ No	☐ Ongoing	☑ Not Applicable

Submitted By Bob Hanson, City Engineer			Date
Address PO BOx 2537	City WIlliston	State ND	ZIP Code 58802
Telephone Number 701-577-6368	Sponsor Email bobh@ci.williston.nd.us	Engineer Email bob.moberg@ae2s.com	

I Certify That, To The Best Of My Knowledge, The Provided Information Is True And Accurate.

Signature Bob Hanson	Date 11 07 17

MAIL TO:

ND State Water Commission • ATTN: Cost-Share Program
900 E Boulevard Ave. • Bismarck, ND 58505-0850

Project Cost Estimate **January 18, 2018**

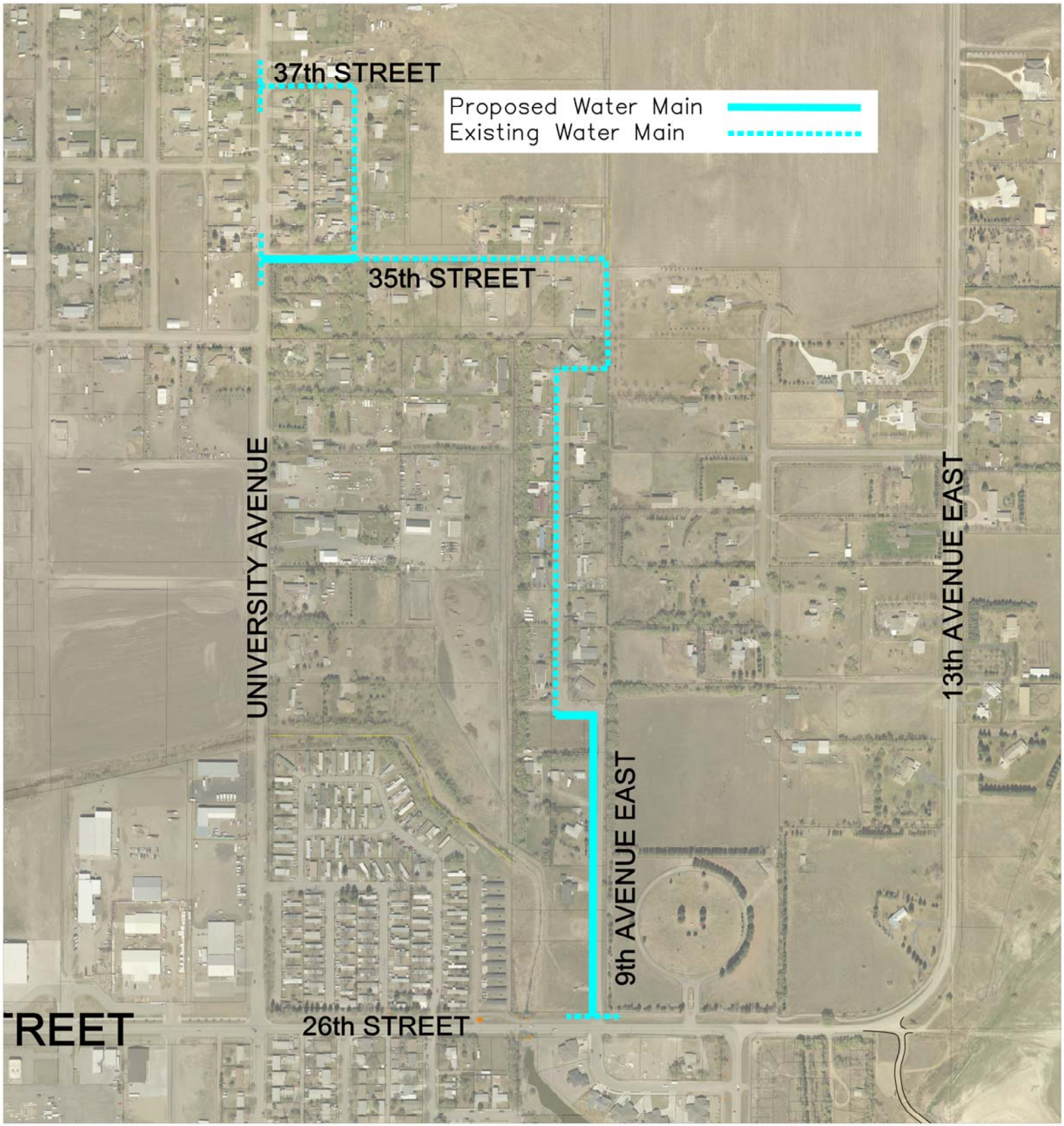
9th Ave E Watermain Extension

SWC Cost Share Grant Application

Williston, ND

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
8-Inch Watermain	1,730	LF	$ 60	$ 103,800
Hydrant Assembly to Ex Syst	10	Ea	$ 10,000	$ 100,000
Hydrant Assembly to New Syst	4	Ea	$ 6,500	$ 26,000
6-Inch Gate Valve	20	Ea	$ 2,500	$ 50,000
8-Inch Gate Valve	8	Ea	$ 2,500	$ 20,000
Watermain Connection	4	Ea	$ 4,000	$ 16,000
Water Service Connections	3	Ea	$ 2,500	$ 7,500
	Estimated Construction			$ 323,300
	Preliminary Engineering			$ 34,500
	Construction Engineering			$ 34,500
	Contingencies			$ 32,075
	Estimated Project Cost			$ 424,375

9th AVENUE EAST
WATER MAIN EXTENSION
WILLISTON, ND



SWC Date Received : 11/8/17

COST-SHARE REQUEST FORM

NORTH DAKOTA STATE WATER COMMISSION
DEVELOPMENT DIVISION
SFN 60439 (3/2017)

This form is to be filled out by the project or program sponsor with State Water Commission staff assistance as needed. Applications for cost-share are accepted at any time. However, applications received less than 30 days before a State Water Commission meeting will be held for consideration at the next scheduled meeting.

Please answer the following questions as completely as possible. Supporting documents such as maps, detailed cost estimates, and engineering reports should be attached to this form. If additional space is required, please use extra sheets as necessary.

For information regarding cost-share program eligibility see the *State Water Commission Cost-Share Policy, Procedure, and General Requirements* – available upon request or at www.swc.nd.gov.

Project, Program, Or Study Name
18th St Watermain Project

Sponsor(s)
City of Williston

County	City	Township/Range/Section
Williams	Williston	

Description Of Request ☑ New ☐ Updated (previously submitted)

Specific Needs Addressed By The Project, Program, Or Study

If Study, What Type ☑ Water Supply ☐ Hydrologic ☐ Floodplain Mgmt. ☐ Feasibility ☐ Other

If Project/Program

☐ Flood Control	☐ Multi-Purpose	☐ Bank Stabilization	☐ Dam Safety/EAP
☐ Recreation	☑ Water Supply	☐ Snagging & Clearing	☐ Property Acquisition
☐ Irrigation	☐ Water Retention	☐ Rural Flood Control	☐ Other

Jurisdictions/Stakeholders Involved
Williston, ND

Description Of Problem Or Need And How Project Addresses That Problem Or Need
The system does not currently have adequate capacity in this area of town to handle peak demand as well as growth. The proposed project provides upgraded hydraulic capacity to the area as well as adequate control valves to improve efficiency of transmission and balance the system. The proposed project is also needed to satisfy flow demands created by the recently constructed East Reservoir & Pump Station project.

Has Feasibility Study Been Completed?	☐ Yes	☐ No	☑ Ongoing	☐ Not Applicable
Has Engineering Design Been Completed?	☐ Yes	☑ No	☐ Ongoing	☐ Not Applicable
Have Land Or Easements Been Acquired?	☐ Yes	☑ No	☐ Ongoing	☐ Not Applicable

Have You Applied For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Applied For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			

Briefly Explain The Level Of Review The Project Or Program Has Undergone

Project has been reviewed by the City Commission

Do You Expect Any Obstacles To Implementation (i.e., problems with land acquisition, permits, funding, local, opposition, environmental concerns, etc.)? No

Funding Timeline (carefully consider when SWC cost-share will be needed)

Source	Total Cost	2015-2017 7/1/15-6/30/17	2017-2019 7/1/17-6/30/19	Beyond 7/1/19
Federal	$	$	$	$
State Water Commission	$ 2,068,800	$	$ 2,068,800	$
Other State	$	$	$	$
Local	$ 1,379,200	$	$ 1,379,200	$
Total	$ 3,448,000	$	$ 3,448,000	$

List All Other State Of North Dakota Funding Sources (Grant or Loan), For Which You Have Applied

ND SWC, City of Williston

Please Explain Implementation Timelines, Considering All Phases And Their Current Status

Design - 2018, Construction - 2019, Completion - 2020

Have Assessment Districts Been Formed? ☐ Yes ☐ No ☐ Ongoing ☑ Not Applicable

Submitted By Bob Hanson, City Engineer			Date
Address PO BOx 2537	City WIlliston	State ND	ZIP Code 58802
Telephone Number 701-577-6368	Sponsor Email bobh@ci.williston.nd.us	Engineer Email bob.moberg@ae2s.com	

I Certify That, To The Best Of My Knowledge, The Provided Information Is True And Accurate.

Signature BOB HANSON	Date 11 07 17

MAIL TO:

ND State Water Commission • ATTN: Cost-Share Program
900 E Boulevard Ave. • Bismarck, ND 58505-0850

Project Cost Estimate **January 18, 2018**

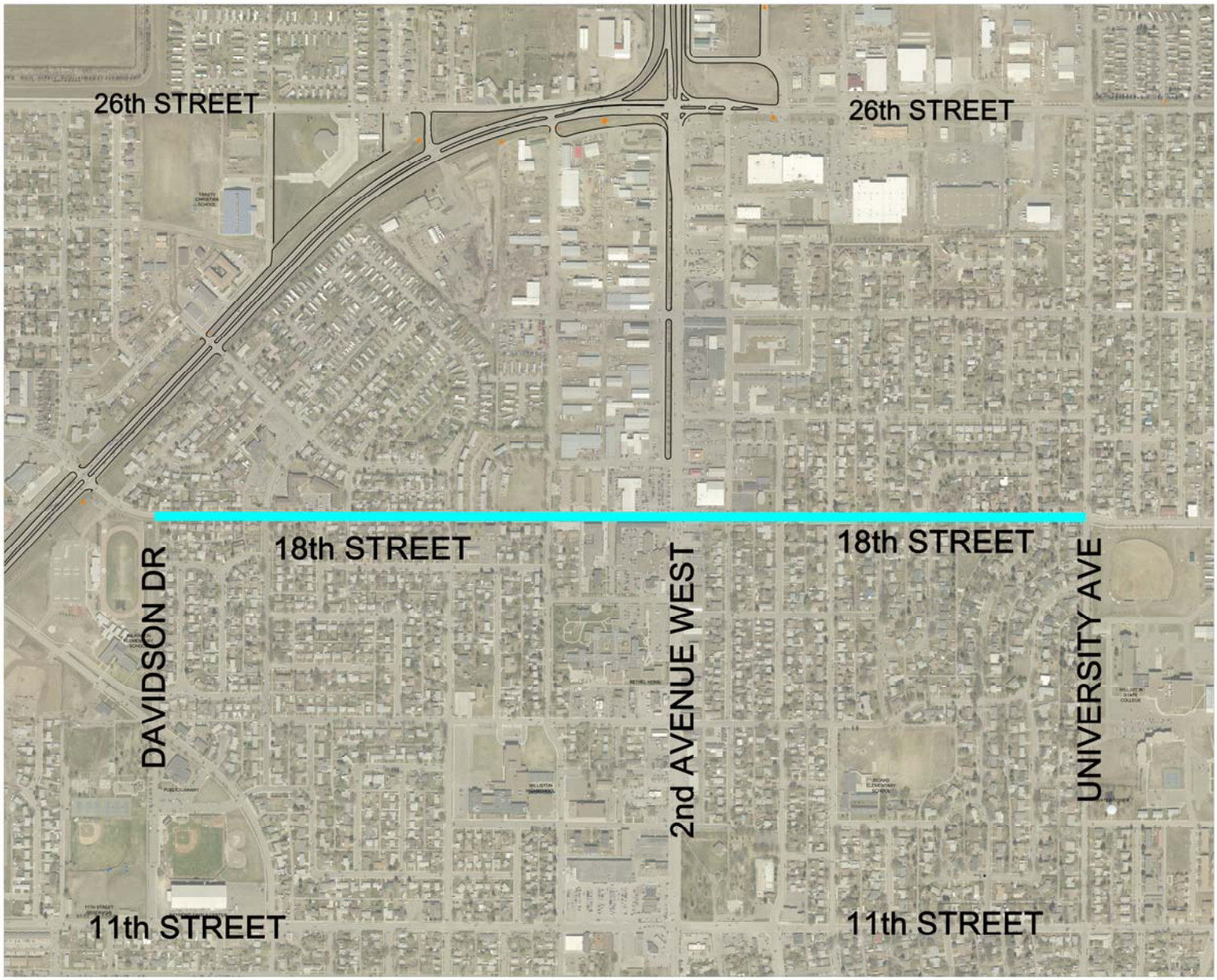
18th Street Watermain Improvement

SWC Cost Share Grant Application

Williston, ND

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL COST
18-Inch Watermain	6,200	LF	$ 300	$ 1,860,000
Hydrant Assembly	10	Ea	$ 9,500	$ 95,000
8-Inch Connenction	7	Ea	$ 6,000	$ 42,000
8-Inch Connection	23	Ea	$ 3,000	$ 69,000
18-Inch Gate Valve	17	Ea	$ 7,500	$ 127,500
8-Inch Gate Valve	24	Ea	$ 3,000	$ 72,000
Water Service Connections	75	Ea	$ 2,500	$ 187,500
Temporary Water System	$ 75,000	L SUM		$ 75,000
Concrete Street Repair	$ 234,197	L SUM		$ 234,197
	Estimated Construction			$ 2,762,197
	Preliminary Engineering			$ 281,000
	Construction Engineering			$ 281,000
	Contingencies			$ 276,220
	Estimated Project Cost			$ 3,600,417

18th STREET
WATER MAIN IMPROVEMENT
WILLISTON, ND



Appendix D

City Hall
254 2nd Ave NE
PO Box 390
Valley City, ND 58072-0390

Phone: 701-845-1700
Fax: 701-845-4588
www.valleycity.us

TO: State Water Commission, State Engineer Garland Erbele P.E.

FROM: David Schelkoph, City Administrator

SUBJECT: Request for funding operational and replacement cost increases due to the irreversible fouling of the ultra-filtration system at the Valley City Water Treatment Plant originating from the treatment of Devils Lake water.

DATE: 11/07/2017

I would like to start out in this letter that the city of Valley City appreciates the financial support the State Water Commission (SWC) has given us in the past and hopefully into the future. Without this state commission, Valley City would not have a state of the art water treatment facility ready for any water quality Issues the Sheyenne River may throw at us. Unfortunately the consequences of Devils Lake water in the Sheyenne River has presented a substantial cost increase and physical damage to our water treatment plant (WTP) that requires Valley City to come to the SWC for help.

To give you Valley City's perspective on this issue I must talk about how we got here. In 2010 the SWC approved a 90/10 cost share to build a reverse osmosis water treatment plant in Valley City. At the time, Valley City was using lime to soften our water supply. This water treatment process could not remove any dissolved substance like sulfates in our river raw water supply. With the proposed pumping of the Devils Lake water into the Sheyenne River basin, Valley City was looking at double and triple sulfate levels from our raw water source. To prevent any adverse health effects from the Devils Lake water to citizens of Valley City, the SWC entered into this cost share agreement to help build our new water treatment plant. The city's 10% cost share came from monies already budgeted to upgrade our aging lime softening plant. A "win win" for all around. Our neighbors to the North would get relief from Devils Lake flooding and Valley City citizens would get protection from the increased sulfate levels and other unknown substances from Devils Lake water introduced into the Sheyenne River.

When negotiating the 90/10 split with the SWC, discussions were entered into about the cost of treating water from Devils Lake. It was agreed to by both Valley City and the SWC that if there were any measurable increased cost from the treatment of Devils Lake water, Valley City could come to the SWC and ask for relief. Today, Valley City is asking for that relief.

A few words about the WTP. The new WTP is a reverse osmosis (RO) plant with an ultra--filtration (UF) pretreatment for the big stuff (engineering term). It is the UF system that has been damaged from Devils Lake water and must be replaced. Currently the UF system has lost 50% of its operational capacity with predicted failure of the UF system 1-2 years. This is less than half of

the predicted minimum life of the system. Valley City was hoping for 20 years of use before a replacement project was needed. We are currently beginning year 6 of the UF system performing for the city.

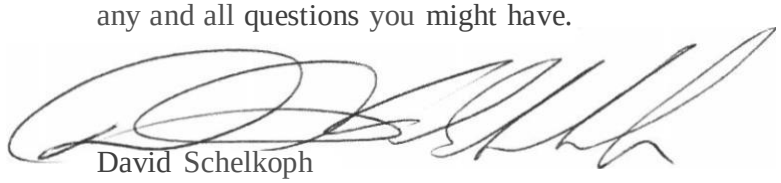
For the past two tears Valley City has been working with GE, the manufacturer of our UF system, to try and understand the fouling of the UF filters. After long hours of work by Valley City and GE we had enough information to present to the SWC for relief from the operational and replacement costs incurred by Valley City due to the treatment of Devils Lake water. Three months ago we asked AE2S to work with GE and Mr. Hesch our WTP Superintendent, for the purpose of studying the fouling of the UF filtering system at the WTP. The results of this study is the report attached in this request. The Valley City Commission has reviewed this report and has given direction to city staff to present this request to the SWC.

The findings of the report include the following:

1. The report confirmed that the Devils Lake water is the cause of the fouling and premature failure of the UF system.
2. Proposed corrective action and associated cost is developed by 5 specific requests.
    a. Purchase one new UF Train from the total of 4 trains with the other three trains purchased the following year after VC verifies that the pretreatment and maintenance cleanings are working. Cost - $378,000
    b. Pluming of the RO water to soak the UF filters. Cost - $75,000
    c. Pretreatment modification to the plant to remove unwanted contaminants before the water enters the UF filters. Cost - $110,000
    d. Miscellaneous costs including Engineering and contingencies. Cost - $107,000
    e. Cost to date to the city for this failure of our UF system. Cost - $204,000

Total request to the SWC is $874,000.00.

Please do not hesitate to call me if you have any questions or comments. I do not guarantee I can answer all of your questions but I can guarantee to get you in contact with those that can. Again, Valley City appreciates all the great work that the SWC does for North Dakota and our community. I look forward to attending the next SWC meeting in December to answer in person any and all questions you might have.



David Schelkoph
City Administrator
Valley City ND

SWC Date Received : 11/8/17

COST-SHARE REQUEST FORM

NORTH DAKOTA STATE WATER COMMISSION
DEVELOPMENT DIVISION
SFN 60439 (3/2017)

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Please answer the following questions as completely as possible. Supporting documents such as maps, detailed cost estimates, and engineering reports should be attached to this form. If additional space is required, please use extra sheets as necessary.

For information regarding cost-share program eligibility see the *State Water Commission Cost-Share Policy, Procedure, and General Requirements* – available upon request or at www.swc.nd.gov.

Project, Program, Or Study Name
Valley City Water Treatment Plant

Sponsor(s)
City of Valley City

County	City	Township/Range/Section
Barnes	Valley City	140N/R58W

Description Of Request ☑ New ☐ Updated (previously submitted)

Specific Needs Addressed By The Project, Program, Or Study
Payment of costs for facility operation and equipment replacement from treating Devils Lake Water

If Study, What Type ☑ Water Supply ☐ Hydrologic ☐ Floodplain Mgmt. ☐ Feasibility ☐ Other

If Project/Program

☑ Flood Control	☐ Multi-Purpose	☐ Bank Stabilization	☐ Dam Safety/EAP
☐ Recreation	☑ Water Supply	☐ Snagging & Clearing	☐ Property Acquisition
☐ Irrigation	☐ Water Retention	☐ Rural Flood Control	☐ Other

Jurisdictions/Stakeholders Involved
City of Valley City

Description Of Problem Or Need And How Project Addresses That Problem Or Need
In 2010 Valley City, in association with the SWC, started the construction of a Reverse Osmosis water treatment plant for the city of Valley City. In March of 2012 the first fully treated water flowed from the plant. When the plant became opperational, Devils Lake water began to flow into the Sheyenne River. Starting two years ago, a study was generated at the request of Valley City because of the fouling and associated increase in operational cost of our ultra filtration system in the new plant. The concluson of this study was that the water from Devils Lake is irreversibly fouling the ultra filtration system associated with the new water treatment plant. We are requesting from the SWC financial assistance to modify the water treatment plant, replace the irreversibly damaged ultra filtration system, and offset additional operation costs associated with Devils Lake water. The attached report is from AE2S and will provide additional details as to how Valley City came this conclusion.

Has Feasibility Study Been Completed?	☑ Yes	☐ No	☐ Ongoing	☐ Not Applicable
Has Engineering Design Been Completed?	☐ Yes	☑ No	☐ Ongoing	☐ Not Applicable
Have Land Or Easements Been Acquired?	☐ Yes	☐ No	☐ Ongoing	☑ Not Applicable

Have You Applied For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any State Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Applied For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			
Have You Been Approved For Any Local Permits?	☐ Yes	☐ No	☑ Not Applicable
If Yes, Please Explain			

Briefly Explain The Level Of Review The Project Or Program Has Undergone
For two years Valley City has been trying to understand the reduced production of their ultra filtration system. After much research on the matter, we have concluded that it is the Devels Lake water that is causing the damage to our filter system. During this process, we have enisted the help from the manufacturer on the filters, GE, and have contracted AE2S to produce the attached report.

Do You Expect Any Obstacles To Implementation (i.e., problems with land acquisition, permits, funding, local, opposition, environmental concerns, etc.)? no

Funding Timeline (carefully consider when SWC cost-share will be needed)

Source	Total Cost	2015-2017 7/1/15-6/30/17	2017-2019 7/1/17-6/30/19	Beyond 7/1/19
Federal	$	$	$	$
State Water Commission	$ 870,000.00	$	$ 870,000.00	$
Other State	$	$	$	$
Local	$ 0.00	$	$ 0.00	$
Total	$ 870,000.00	$ 0	$ 870.000.00	$ 0

List All Other State Of North Dakota Funding Sources (Grant or Loan), For Which You Have Applied
none

Please Explain Implementation Timelines, Considering All Phases And Their Current Status
The report shows that the effectiveness of the ultra filtration system has degraded to a point that total failure is expected within 1-2 years. Valley City would ask that this project be financed for next year's construction season.

Have Assessment Districts Been Formed? ☐ Yes ☐ No ☐ Ongoing ☑ Not Applicable

Submitted By	Date
David Schelkoph, City Administrator	11/08/2017

Address	City	State	ZIP Code
254 2nd Ave. NE	Valley City	ND	58072

Telephone Number	Sponsor Email	Engineer Email
701-845-8120	dschelkoph@valleycity.us	perry.johnson@ae2s.com

I Certify That, To The Best Of My Knowledge, The Provided Information Is True And Accurate.

Signature	Date
	11/08.2017

MAIL TO:

ND State Water Commission • ATTN: Cost-Share Program
900 E Boulevard Ave. • Bismarck, ND 58505-0850

TECHNICAL MEMORANDUM

To: City of Valley City (David Schelkoph City Administrator)

From: Perry Johnson, PE
AE2S

Re: **Valley City WTP Ultra Filtration Membrane Replacement**

Date: October, 2017

INTRODUCTION

The City of Valley City operates a water treatment facility providing potable water to its residents and surrounding commercial and industrial users including the Valley City State University and several elderly care facilities. In July of 2009 the North Dakota Department of Health (NDDH) announced their intention to increase flow from Devils Lake into the Sheyenne River. At that time the sulfate levels in the west end of Devils Lake were at about 600 mg/l and 2,600 mg/l in the east end of Devils Lake and Stump Lake. The NDDH introduced an emergency rule for discharge from Devils Lake that would allow sulfate levels in the Sheyenne River to reach 750 mg/l but at a point 1/10 of a mile downstream of Baldhill Dam a level of no more than 450 mg/l would be maintained. With the secondary maximum contaminant level (MCL) for sulfate of 250 mg/l set by the EPA it was determined that treatment of water to reduce the level of sulfate for domestic use should be introduced at the Valley City water treatment plant. An evaluation of treatment options was conducted and a membrane plant consisting of Ultrafiltration (UF) membranes for removal of particulates and microorganisms followed by Nanofiltration membranes for the removal of dissolved solids, such as sulfate was selected as the most efficient and proven alternative.

Prior to the release of Devils Lake water into the Sheyenne River, a pilot study was performed to determine the number of membranes required to provide a 4 million gallon per day treatment facility for the City of Valley City. The pilot plant did not implement a pretreatment system and operated for 4.5 months on a series of well water, river water and a blend of Sheyenne River water and city well water. The results of the study indicated that the UF membranes were not negatively affected by constituents in the water, and that a serviceable lifetime of the UF membranes of 10 to 15 years could be realized, assuming they are properly maintained. A pretreatment system had been designed for the plant but when the pilot plant showed no signs of membrane fouling without a pretreatment system it was deleted from the project as a cost saving measure. Based on the pilot findings and computer modeling conducted by the membrane supplier, the facility was designed with four UF membrane trains each consisting of three cassettes populated with 48 membrane modules.

Construction of the treatment facility was completed and the UF membranes were brought on line in October of 2011. The membranes have been in operation now for six years and are experiencing irreversible fouling which has reduced the flow capacity of the plant to less than

half of the design capacity, indicating a need for membrane replacement. A study of the membrane performance and an autopsy performed on some used membranes has revealed that contaminants in the Sheyenne River have fouled the UF membranes reducing their capacity and requiring cleaning at a frequency that is not sustainable and has led to a premature requirement for replacement. The following paragraphs present the study and autopsy findings to support this conclusion.

MEMBRANE PERMEABILITY

The ultrafiltration membranes at the Valley City plant are submerged membranes that operate under a vacuum drawing the water from the outside of the hollow tube membrane in. Flow through membranes is measured in gallons per day per square foot (gfd) of membrane area and is referred to as the membrane flux rate. The negative pressure or "suction" required to draw water through the membrane is referred to as the transmembrane pressure or TMP expressed in pounds per square inch (psi). Permeability of the membrane is defined as the flux divided by the TMP and expressed in units of gfd/psi. Permeability can be used to quantify membrane efficiency since it measures the amount of flow per unit of applied force. As such the permeability of the UF membranes is an excellent parameter used to determine their operational capacity. The initial permeability of new membranes immediately after cleaning is expected to be about 14 gallons per square foot per day per psi (gfd/psi). Typically, the post cleaning permeability of membranes can drop to about 5 gfd/psi before the membranes need to be replaced. The membrane modules are designed to be cleaned once a month to restore the permeability that drops during the 30-day operating period. It is not unusual to see a steady permeability drop to as low as 1.5 or 2 gfd/psi just prior to a cleaning. Depending on the transmembrane pressure applied to the system, the flux or flow rate will vary with the permeability. The Valley City system was designed to produce 4.66 million gallons of water per day (mgd) based on a flux rate of 18 gallons per square foot per day with a 30-day cleaning interval. At their present diminished permeability, in order to maintain the membrane flux rate, the plant must clean the membranes every other day in order to meet a current plant demand of less than 2.0 mgd. Unfortunately, cleaning the membranes this frequently, reduces the useful life of the membranes and reduces plant capacity since cleaning multiple trains simultaneously reduces the number of trains that are available to filter water.

When the UF membranes at the Valley City WTP were placed into service, an operational protocol was established using a blend of river and well water. The typical summer blend was planned to be about 50% from each water source. The density of water changes with temperature, as the temperature of water decreases the density of water increases. The increased density of the water makes it more difficult to pass through the tiny pores of the membrane decreasing the permeability of the membranes. During the winter, the well water is warmer than river water so the blend at the Valley City plant is changed to predominantly well water to maintain the highest permeability possible and reduce operational power costs. During the summer, the temperature of the river water is warmer than the well water so the blend is reversed.

The attached graph shows the permeability fluctuations of the Valley City UF membranes related to the blend ratio of the raw water entering the plant. Each summer from May to November when the plant is typically operated with a blend ratio of 50:50 or 60:40 river to well water the permeability has dropped. A slight recovery has occurred each winter when the raw water ratio of well water was increased.

Historically the Valley City water treatment plant had utilized lime softening to remove hardness in the raw water. With the implementation of membranes for sulfate removal the lime softening

was no longer required as the nanofiltration membranes that remove the sulfate also remove hardness. Through the first five months of UF membrane operation, from October 2011 to February 2012 lime softening system was still in operation as construction phasing was being completed. For those several months, the UF membranes were supplied with lime softened water, the water temperatures remained fairly constant and the permeability of the membranes remained between 13.5 and 14 gfd/psi. In February of 2012 the lime softening system was removed as construction of the membrane system was completed. The permeability of the membranes dropped over the next couple of months to about 12 gfd/psi and remained at that level for the next couple of months. In May of 2012 the plant increased the amount of river water that was blended with the well water and immediately saw a sharp reduction in permeability. From May to November of 2012 the permeability dropped from 12 gfd/psi to 8 gfd/psi. At that time problems with the river intake forced the plant to process well water without any river blend. The permeability of the membranes rebounded immediately and continued to rise for the next several months back to about 11 gfd/psi. In the spring of 2013 with the intake issues remedied and the wells having been drawn down, the plant then switched back to a blended water but increased the ratio of river water to well water to about 65 to 70 percent and 30 to 35 percent respectively, in an attempt to allow the wells to recharge. When treating this water with a higher concentration of river water the permeability began a steep decline that continued through the summer driving the permeability of the membranes down to about 6.5 gfd/psi by November of 2013. From that point in time the permeability of the membranes has recovered slightly each winter when the river water ratio was decreased but would once again diminish in the summer when river water ratios were increased. This trend has continued so the present permeability is about 3.0 gfd/psi and the plant capacity has been reduced to less than 2 mgd.

The attached graph shows the membrane permeability relative to the changes in the raw water intake ratios of river water versus well water. It is evident from this graph that when more than 50 percent of the raw water entering the plant is from the Sheyenne river the permeability of the membranes decreases significantly and when the well water percentage is increased, the permeability remains constant or increases. This trend indicates that the constituents in the river water are the likely source of the membrane fouling and are responsible for the decreased membrane permeability.

TRANSMEMBRANE PRESSURE (TMP)

As mentioned previously, another indicator of membrane performance is transmembrane pressure. The UF membranes at the Valley City WTP operate on suction with flow from the outside of the membrane to the inside. Each membrane fiber is a hollow tube, negative pressure or suction is applied to the tube drawing the water through the membrane material into the straw like hollow tube. This suction is termed the transmembrane pressure and measures the negative pressure required to draw the water through the membrane material. When the membranes are new the transmembrane pressure will typically be 2 to 3 psi. As the membranes are fouled with contaminants from the water the TMP rises. The maximum negative pressure that could be applied to the membranes is that of a complete vacuum or approximately negative 13 psi and the system is designed to automatically shut down if the TMP reaches negative 12 psi. TMP correlates well with the membrane permeability, as the permeability decreases the pressure required to force water through the membrane material increases. In recent months, the TMP of the Valley City membranes has been reaching levels of negative 7 to 8 psi as the permeability has dropped to less than 4 gfd/psi and the flux rate has dropped to about 10 gfd. In an effort to determine if a higher flux rate through the membranes could be sustained at a higher TMP that is still below the shutdown range, one membrane train was isolated and a higher flow rate applied. As the flux rate was increased from about one half of the design capacity to about

two thirds the TMP immediately began to rise and at a flux rate much less than design the TMP reached the maximum negative 12 psi. It is evident that the fouling of the membranes is severe enough that they cannot be operated at a flow rate of more than half of the flow rate for which they were designed.

DEVILS LAKE DISCHARGE

In the latter part of June 2012 the East End (Stump Lake) discharge at Tolna Coulee was first utilized and a flow of about 325 cubic feet per second (cfs) was released into the Sheyenne River. This flow combined with about 300 cfs from the Devils Lake west end pump station increased the flow in the Sheyenne by about 625 cfs. This blend of water resulted in a raw water with a much higher contaminant loading and lower quality than was previously seen in the Sheyenne River. The water from Devils Lake and the Tolna Coulee flows through the upper Sheyenne river to Lake Ashtabula. The volume of Lake Ashtabula is about 70,500 acre feet. Assuming a flow in and out of the lake of about 600 cfs the contents of the lake are replaced about every 65 days. The river mileage from Tolna Coulee to Valley City is about 64 miles requiring about 6 days for the water to travel through the river channel. From the first discharge in June of 2012 to when the poorer quality water reached Valley City was probably about 75 days or around the beginning of September 2012. Since that time with the annual discharge from Devils Lake the water quality has remained a lessor quality than the water first tested in the Valley City pilot study. Based on the data, this poorer quality water has led to the fouling of the UF membranes at the Valley City WTP requiring premature replacement.

OPERATIONAL MODIFICATIONS IMPLEMENTED

After a loss in membrane permeability was witnessed, some modifications were made in plant operations to minimize the effects of the membrane fouling. New cleaning techniques were applied using different acids and chemicals in an attempt to clean the foulants from the membrane fibers and restore flow capacity. The annual cost of chemicals has increased from about $155,000 in 2012 to over $250,000 in 2017. These modified cleaning techniques showed no improvement in performance. It appears that the membranes are fouled beyond the point where operational changes will restore lost permeability. At the reduced plant capacity, operational hours have been extended to produce the daily water demands which has increased the labor costs of plant operations.

FINDINGS

The attached graph indicates that the membrane permeability tends to recover when the percentage of raw water from the river is lower than that of the wells. This leads us to believe that the predominant foulants are organic. This conclusion is strengthened by the testimony of the plant operators that the permeability is improved more with the chorine cleans than with acidic cleans. From the membrane autopsy that was conducted, it is evident that inorganic fouling is also occurring, therefore the reduction of organic and inorganic fouling must be addressed.

Organic fouling is typically reduced through sodium hypochlorite (chlorine) based cleaning procedures, while inorganic fouling is typically reduced using acid cleans. In order to reduce the fouling of the membranes both organic and inorganic contaminants must be addressed. Enhanced pretreatment could be effective in reducing the organic and inorganic loadings on the membranes. The addition of coagulants and improved settling through a pretreatment system can be effective in removing organic compounds while the addition of an antiscalant to the pretreatment having the proper time to react with the compounds in the water can be effective in

reducing the potential for inorganic fouling. The reduced organic loading will then be further controlled using sodium hypochlorite (chlorine) maintenance cleans while periodic acid cleans will control the inorganic fouling potential.

Consideration has been given to alternatives that have proven effective in reducing both organic and inorganic fouling on UF membranes. In consultation with General Electric (GE), manufacturers of the UF membranes, we recommend the development of a more intense and deliberate pretreatment process and provide the ability to soak the membranes in slightly acidic Reverse Osmosis (RO) permeate water when not in operation.

To provide a better pretreatment process, the old lime softening contact equipment in the existing pretreatment basin can be removed and a single stage flocculation chamber followed by baffling to increase detention time and eliminate short circuiting of water within the basin be added. The final baffle should be constructed as an over flow weir prohibiting the transmission of sludge from the pretreatment basin to the UF membranes.

In order to soak the membranes in RO permeate, a pipe can be extended from the existing RO facility to the UF membrane trains. This system would include automated valves to direct water from the RO system to the UF trains and provide the ability to direct water to each of the membrane trains as selected by the operators.

CONCLUSIONS

1. Constituents in the Devils Lake and Stump Lake water discharged into the Sheyenne River are causing organic and inorganic fouling of the Valley City UF membranes.
2. The UF membranes are irreversibly fouled such that the permeability has been reduced to nearly 3 gfd/psi, and plant capacity is now less than half of the design capacity.
3. Permeability continues to decline and will eventually restrict the plant capacity to less than the daily demand without membrane replacement.
4. Cost of chemicals, power and labor to operate the plant continue to increase with loss of membrane permeability.

RECOMMENDATIONS

The following recommendations are made based on the conclusions stated above:

1. The existing lime softening equipment remaining in the pretreatment basin should be removed.
2. A chemical mixing, flocculation and settling system be installed in the existing pretreatment basin.
3. One full train of new membrane modules (144) be purchased and placed into one system train and the existing modules from that train be distributed into blank spaces available in the other three trains.
4. The plant be operated utilizing the enhanced pretreatment and cleaning routines for six months to one year and the new membranes monitored as a study period to determine if the changes to the process and cleaning routines control organic and inorganic fouling as desired.

5. At the end of the study period, adjust the process as needed and purchase 432 membrane modules to replace the used modules in the remaining three treatment trains.

OPINION OF PROBABLE COST

The following is an opinion of probable cost for the recommended phased membrane replacement approach:

Valley City Membrane Replacement Phase 1		Cost
Pretreatment Modifications		
Remove Exisitng Equipment	$	30,000.00
Install FRP Baffle System	$	45,000.00
Purchase and Install Flocculator	$	20,000.00
Electrical Equipment and Installation	$	10,000.00
Instrumentation Equipment	$	5,000.00
Sub total	**$**	**110,000.00**
RO Permeate System		
4 inch PVC Pipe	$	5,000.00
5 -4 inch Automated Modulating Butterfly valves	$	40,000.00
3 -6 inch Automated Butterfly Valves	$	30,000.00
Sub total	**$**	**75,000.00**
Constrution Total	**$**	**185,000.00**
Purchase of 144 membrane modules	**$**	**378,230.00**
Miscellaneous		
Contingencies @ 15%	$	27,750.00
Engineering Design and bidding	$	25,000.00
Construction Phase Engineering	$	10,000.00
Field I&C	$	25,000.00
Warranty Period Engineering (with inspection)	$	10,000.00
Legal and Administration @5%	$	9,250.00
Sub total	**$**	**107,000.00**
Total Project Costs =	**$**	**670,230.00**

After operating with the new membranes in the one train for the designated period of time and seeing that the fouling potential of the membranes has been reduced by the operation and cleaning methods employed, Phase 2 of the project should be initiated. Phase 2 includes the purchase of new membrane modules to replace the fouled modules in the remaining three trains.

The replacement cost of the remainder of the membrane modules is estimated to be about $953,200 in 2018 dollars.

ADDITIONAL FUND REQUEST

The City of Valley City has operated the membrane water treatment plant since October 2011. After the introduction of Devils Lake water the permeability of the membranes has continued to decrease as demonstrated on the attached graph. Each year of operation the chemical costs of operation have increased. Extended hours of operation have been required to produce enough water to meet the daily demands. It was an understanding of the City that the State Water Commission would continue to support the operation and maintenance of this plant knowing this technology was needed to treat Devils Lake water to a potable level. Since the fouling of the membranes appears to be directly related to the treatment of Devils Lake water, the City respectfully requests that consideration be given by the State Water Commission to reimbursement for operational costs that were not anticipated but have resulted from the constituents present in the water coming from Devils Lake in the Sheyenne River. Though the additional labor that has been expended to maintain and operate the membrane plant with its diminished capacity is difficult to document, direct overtime pay amounting to $3,557.00 has been paid in the last year alone. The City will cover these direct operations and maintenance labor costs but request that consideration be given by the commission to cover the engineering costs that have been incurred. The amount of reimbursement requested is as follows:

Addition Operations and Maintenance Costs

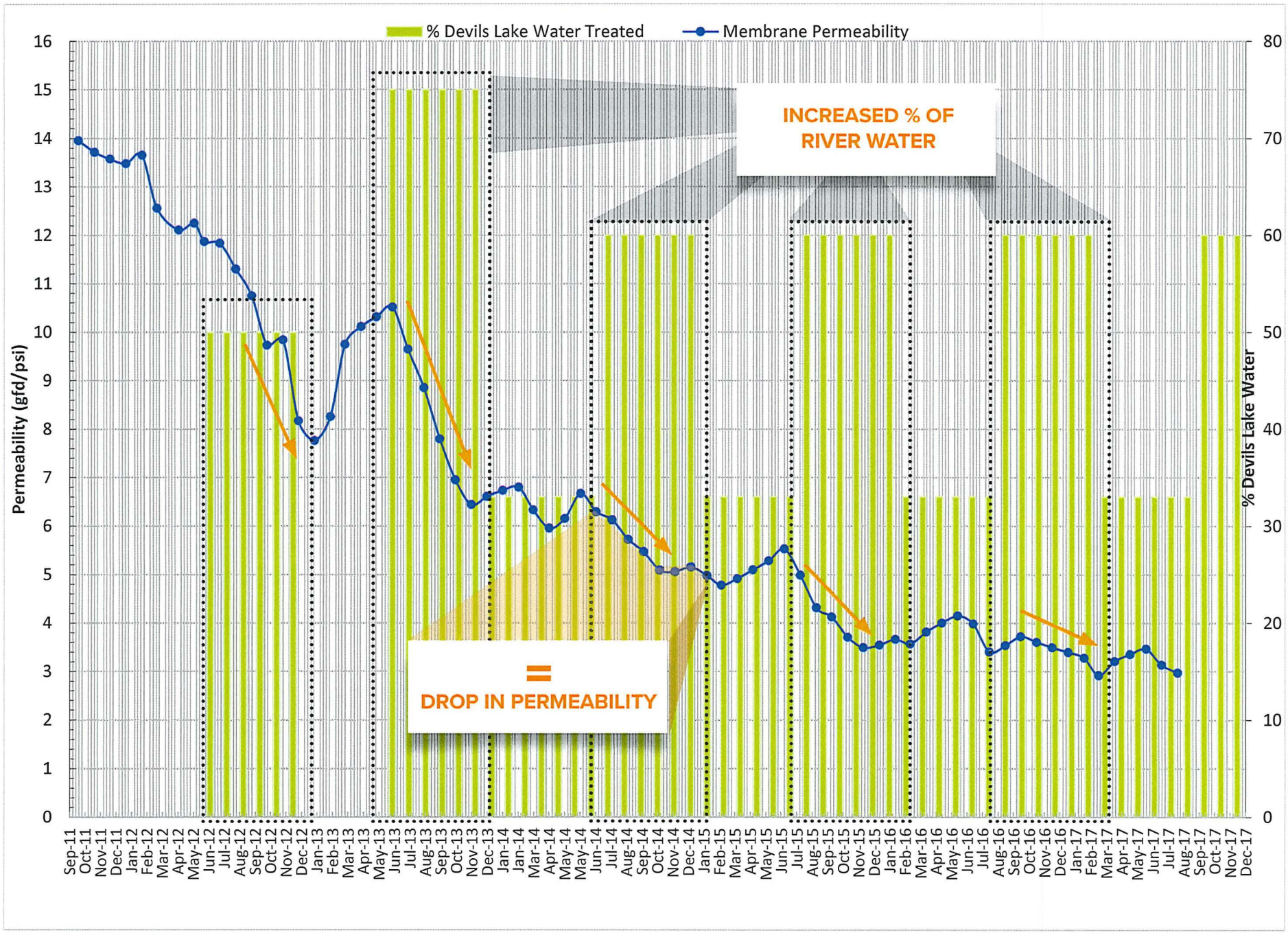
Chemicals ----------$197,466.00 (See attached Cost of Chemicals)

Labor ----------$3,557.00 (covered by Valley City)

Engineering ---------- $6,927.00

Total ----------$207,950.00

Reimbursement Request ----------$204,393.00


% Devils Lake Water Treated
Membrane Permeability
INCREASED % OF RIVER WATER
=
DROP IN PERMEABILITY
Permeability (gfd/psi)
% Devils Lake Water
0
1
2
3
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Valley City WTP Annual Chemical Costs							
Chemical	**2017 proj**	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**
CHLORINE	$ 10,440.73	$ 9,616.22	$ 8,655.36	$ 7,092.31	$ 6,258.96	$ 5,909.49	$ 4,802.68
PHOSPHATE	$ 8,426.67	$ 6,478.00	$ 1,450.73	$ 2,212.00	$ 6,003.55	$ 8,505.33	$ 6,108.05
HYDROFLUOSILICIC	$ 7,163.29	$ 6,127.01	$ 7,049.45	$ 4,532.28	$ 7,184.36	$ 9,519.69	$ 7,610.66
AQUAHAWK 607	$ 8,617.76	$ 10,562.28	$ 1,106.07				$ 486.80
AMMONIUM HYDROXIDE	$ 16,090.13	$ 15,398.45	$ 16,068.88	$ 11,316.48	$ 13,102.89	$ 10,314.41	$ 7,553.80
CITRIC ACID	$ 4,157.19	$ 3,439.89	$ 13,384.26	$ 14,775.66	$ 20,532.37	$ 12,950.17	$ 1,459.60
SODIUM BISULFITE	$ 13,386.60	$ 9,709.29	$ 12,028.56	$ 16,179.47	$ 16,426.71	$ 13,715.90	$ 749.21
CAUSTIC SODA	$ 76,888.15	$ 63,004.04	$ 54,187.35	$ 45,621.62	$ 32,838.42	$ 22,013.95	$ 437.24
SODIUM HYPOCHLORITE	$ 11,598.96	$ 10,617.86	$ 13,697.66	$ 13,671.97	$ 12,950.74	$ 10,032.63	$ 1,709.53
HYDROCHLORIC ACID	$ 1,032.73	$ 1,000.12	$ 3,346.41	$ 3,857.08	$ 1,389.39	$ 100.59	$ -
SULFURIC ACID	$ 62,097.72	$ 51,183.27	$ 38,920.36	$ 26,758.47	$ 21,891.52	$ 20,524.24	$ -
SOD PERMANGANATE	$ 17,690.75	$ 15,332.77	$ 15,268.46	$ 13,435.10	$ 14,751.19	$ 15,896.94	$ -
ANTISCALANT	$ 25,707.63	$ 23,811.79	$ 22,251.84	$ 20,724.47	$ 13,468.77	$ 5,337.50	$ -
TOTAL Annual Cost	$ 263,298.31	$226,280.99	$207,415.39	$180,176.91	$166,798.87	$154,798.60	$108,812.64
2012 Assumed as baseline for chemical costs with an assumed 3% per year inflation rate							
Anticipated annual cost adjusted for inflation	$ 179,454.00	$174,227.19	$169,152.61	$164,225.83	$159,442.56		
Actual cost minus adjusted baseline cost	$ 83,844.31	$ 52,053.80	$ 38,262.78	$ 15,951.08	$ 7,356.31		
Requested Chemical Cost Reimbursement	**$ 197,468.28**						


Pond Pipeline
River Discharge
Existing Water Plant
N
57 Acre Pond
70 Acre Pond
20 Acre Pond
Pond Discharge
Existing Lagoons


Water Treatment Plant
Berea
Valley City
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19

Appendix E

Bartlett & West

3456 E Century Avenue
Bismarck, ND 58503
ph (701) 258-1110
www.bartwest.com

January 9, 2018

ND State Water Commission
Attn. Mr. Jeffrey Mattern
900 East Boulevard Ave.
Bismarck, ND 58505

Garrison Diversion Conservancy District
Attn. Mr. Duane Dekrey
PO Box 140
Carrington, ND 58421-00140

Gentlemen;

By this letter, South Central Regional Water District (SCWD) is formally requesting consideration for the transfer of unused MR&I funds from previous phases for the completion of Phase 5 (North Logan and Kidder County) of the Expansion Project.

There have been a significant number of additional sign-ups since the initial construction contract for Phase 5 was bid. At that time, the initial construction contract included 329 services. Since then, an additional 171 services have been added through project field orders/change orders and SCWD continues to receive additional applications. Due to these additional sign-ups, a booster station will be necessary to provide adequate water pressure and flow for all planned and future users in the Phase 5 area.

We appreciate your consideration on this matter as the transfer of remaining funding from previous phases to Phase 5 would allow SCWD to serve more of the potential users that are requesting service as this may be their last chance to receive rural water.

If you have any additional questions or need additional information, please feel free to contact me.

Sincerely,

BARTLETT & WEST, INC.

Phil Markwed

Phil Markwed, P.E.
Project Manager

cc: SCWD – Larry Kassian
File: SCWD 2017-3: 1.0

FEDERAL MUNICIPAL, RURAL, AND INDUSTRIAL WATER SUPPLY PROGRAM APPLICATION FOR COST-SHARE

NORTH DAKOTA STATE WATER COMMISSION
SFN 60796 (3/2015)

RECEIVED
SEP 26 2017
STATE WATER COMMISSION

Submit application to Garrison Diversion Conservancy District and ND State Water Commission.

Project Sponsor: South Central Regional Water District			Date: September 25, 2017
Contact Person Name: Larry Kassian			Title: Executive Director
Address: PO Box 4182	City: Bismarck	State: ND	ZIP Code: 58502
Telephone Number: 701-258-8710	Email Address: larrykscwd@bektel.com		
Engineering Firm Name: Bartlett & West			
Project Engineer Name: Philip Markwed	Telephone Number: 701-221-8346		
Email Address: philip.markwed@bartwest.com			
Project Name: Logan County Booster Procurement			

Project Needs, Objectives, & Benefits

With the significant number of additional sign-ups for the South Central Regional Water District (SCWD) Phase 5 expansion a booster station is needed to provide adequate pressure and flow for all planned and future users in the Phase 5 area. This project will allow SCWD to procure a booster station which will provide the additional pressure and flow.

Area To Be Served

*See attached overall system map. The booster station will assist in serving the Phase 5 users

Preliminary Engineering Report Included ☐ Yes ☒ No

Project Funding	SOURCE	FEASIBILITY STUDY	DESIGN	CONSTRUCTION	TOTAL
	Federal	$	$	$ 495,000.00	$ 495,000.00
	State	$	$	$	$ 0.00
	Local	$	$	$ 165,000.00	$ 165,000.00
	Other	$	$	$	$ 0.00
	TOTAL	$ 0.00	$ 0.00	$ 660,000.00	$ 660,000.00

Describe Efforts To Secure Other Funding For Project

Funding for the SCWD Phase 5 project has already been secured through previous cost-share agreements and a DWSRF loan.

Water Rate Schedule		CURRENT	AFTER PROJECT	NOTE
	Base Rate	$	$	*see attached rate information
	Cost Per 1,000 Gallons	$	$	*see attached rate information
	Gallons In Base Rate			*see attached rate information
	Cost For 5,000 Gallons	$	$	*see attached rate information
	Service Connections			*No change (addressed in Phase 5)
	Population			*No change (addressed in Phase 5)

Feasibility Study	Start N/A	End N/A
Design	Start Complete	End Complete
Construction	Start Fall 2017	End Spring 2018

EXISTING SCWD PIPELINE
PHASE 5 SCWD 2015-1 & 2015-1A
STATELINE RURAL WATER SYSTEM
INTAKE
WATER TREATMENT PLANT
TANK
BOOSTER STATION

South Central Regional Water District

System Map 2017

STATE OF NORTH DAKOTA

BURLEIGH COUNTY WATER TREATMENT PLANT
Moffit
BURLEIGH COUNTY
Steele
Dawson
Tappen
Crystal Springs
KIDDER COUNTY
LOGAN COUNTY
LOGAN CO. BOOSTER
Braddock
Kintyre
Napoleon
Hazelton
Temvik
LAKE OAHE TANK
INTAKE
EAST LINTON BOOSTER
JACOB BUTTE TANK
Linton
McINTOSH CO. TANK
McINTOSH CO. BOOSTER
Wishek
Lehr
EMMONS COUNTY WATER TREATMENT PLANT
STRASBURG BOOSTER
STRASBURG TANK
Strasburg
Danzig
Hague
Ashley
STATELINE WATER COOP
EMMONS COUNTY
Zeeland
Venturia

Bartlett & West
Driving Community and Industry Forward, Together.

DRAFT

October 1, 2017

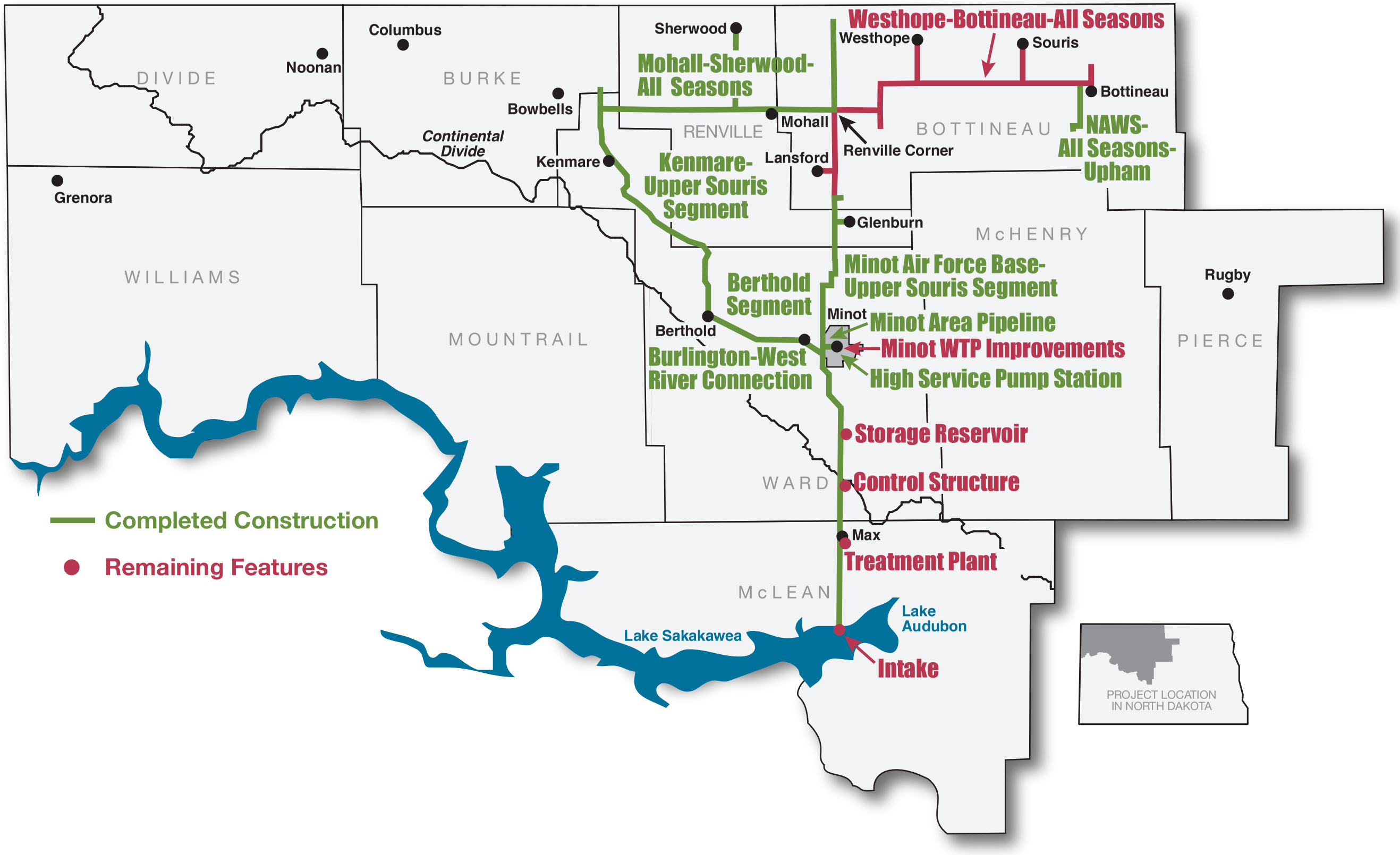
Garrison Diversion Unit
State Municipal, Rural, and Industrial Water Supply Program
Five Year Plan 2018 - 2022
Cooperative Agreement No. R17AC00049

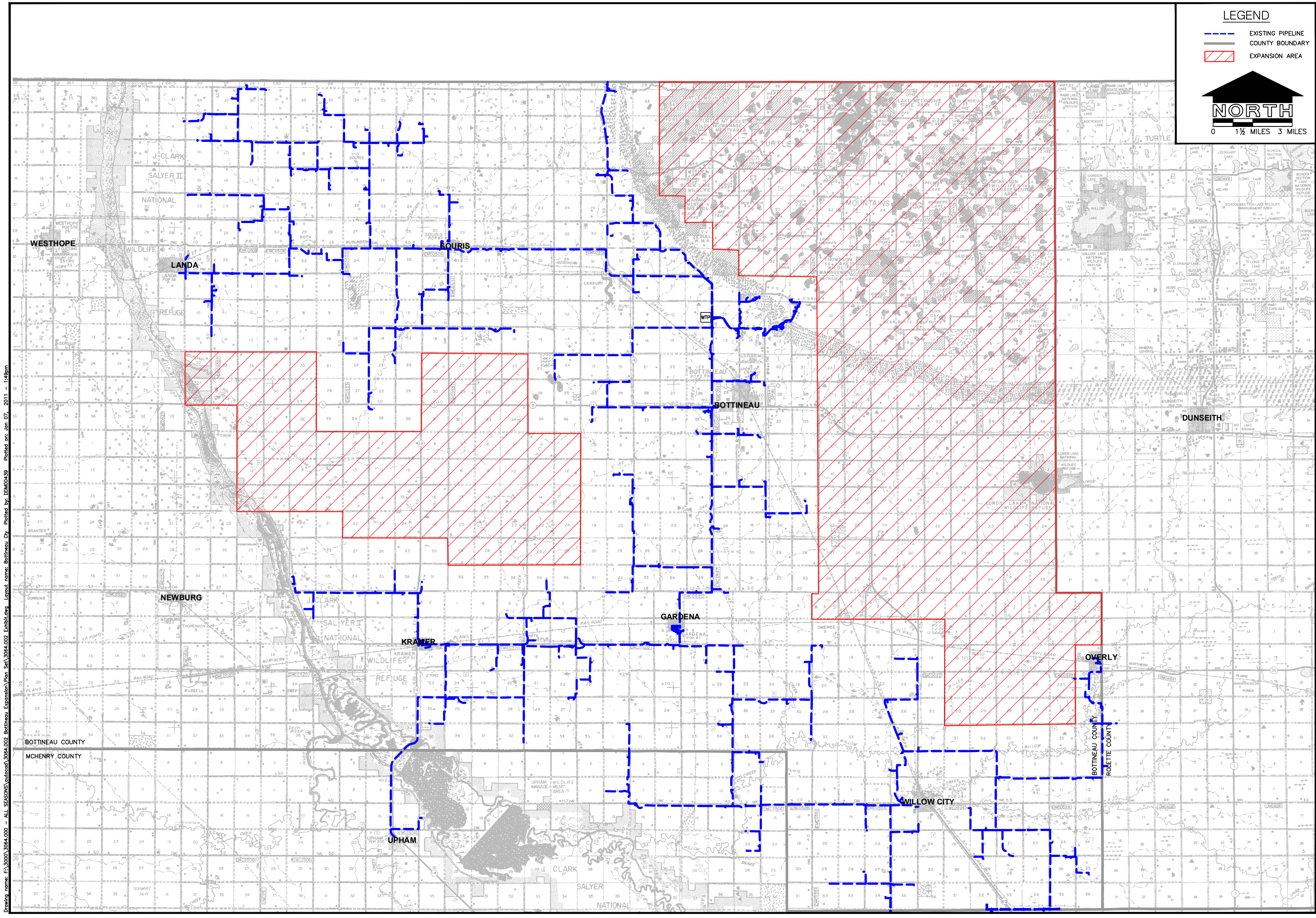
Project	Total Costs			FY 2018			FY 2019			FY 2020		
	Non Federal Share	Federal Share	Project Total	Non Federal Share	Federal Share	Project Total	Non Federal Share	Federal Share	Project Total	Non Federal Share	Federal Share	Project Total
NAWS Intake Design	695,660	1,291,940	1,987,600	695,660	1,291,940	1,987,600	0	0	0	0	0	0
NAWS Pipeline/Inline/Storage/Pumps Design	610,710	1,134,190	1,744,900	610,710	1,134,190	1,744,900	0	0	0	0	0	0
NAWS Intake Construction	4,554,340	8,458,060	13,012,400	0	0	0	0	0	0	0	0	0
NAWS Pipeline/Inline/Storage/Pumps Construction	9,421,429	17,496,940	26,918,369	0	0	0	4,264,269	7,919,350	12,183,619	4,687,880	8,706,070	13,393,950
NAWS Minot Phase II WTP Design	712,250	1,322,750	2,035,000	712,250	1,322,750	2,035,000	0	0	0	0	0	0
NAWS Minot Phase II WTP Construction	8,925,000	16,575,000	25,500,000	4,462,500	8,287,500	12,750,000	4,462,500	8,287,500	12,750,000	0	0	0
NAWS Biota WTP Design	0	4,970,000	4,970,000	0	4,970,000	4,970,000	0	0	0	0	0	0
NAWS Biota WTP Construction	0	80,157,980	80,157,980	0	0	0	0	8,015,800	8,015,800	0	20,039,500	20,039,500
NAWS Lansford Reservoir/Pump Station Design	546,660	1,015,240	1,561,900	0	0	0	546,660	1,015,240	1,561,900	0	0	0
NAWS Lansford Reservoir/Pump Station Construction	5,656,730	10,505,370	16,162,100	0	0	0	0	0	0	0	0	0
NAWS Minot Phase III WTP Design	332,220	616,980	949,200	0	0	0	332,220	616,980	949,200	0	0	0
NAWS Minot Phase III WTP Construction	2,467,780	4,583,020	7,050,800	0	0	0	0	0	0	0	0	0
NAWS South Prairie Reservoir Design	287,520	533,980	821,500	0	0	0	0	0	0	0	0	0
NAWS South Prairie Reservoir Construction	3,212,470	5,966,030	9,178,500	0	0	0	0	0	0	0	0	0
NAWS Bottineau/All Seasons Pumps and Storage Construction	2,626,990	4,878,710	7,505,700	0	0	0	0	0	0	0	0	0
NAWS Supply System Evaluation and Initiation	875,000	1,625,000	2,500,000	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
All Seasons Water Users District System 1 Expansion-Design	500,000	1,500,000	2,000,000	0	0	0	0	0	0	500,000	1,500,000	2,000,000
All Seasons Water Users District System 1 Expansion-Const	6,031,780	18,095,320	24,127,100	0	0	0	0	0	0	0	0	0
Administration (BOR/GDCD/SWC)	127,419	3,673,922	3,801,341	24,000	692,000	716,000	24,720	712,760	737,480	25,462	734,143	759,604
Total	$47,583,958	$184,400,432	$231,984,390	$6,505,120	$17,698,380	$24,203,500	$9,630,369	$26,567,630	$36,197,999	$5,213,342	$30,979,713	$36,193,054

Project	FY 2021			FY 2022			
	Non Federal Share	Federal Share	Project Total	Non Federal Share	Federal Share	Project Total	%
NAWS Intake Design	0	0	0	0	0	0	65%
NAWS Pipeline/Inline/Storage/Pumps Design	0	0	0	0	0	0	65%
NAWS Intake Construction	3,500,000	6,500,000	10,000,000	1,054,340	1,958,060	3,012,400	65%
NAWS Pipeline/Inline/Storage/Pumps Construction	469,280	871,520	1,340,800	0	0	0	65%
NAWS Minot Phase II WTP Design	0	0	0	0	0	0	65%
NAWS Minot Phase II WTP Construction	0	0	0	0	0	0	65%
NAWS Biota WTP Design	0	0	0	0	0	0	100%
NAWS Biota WTP Construction	0	32,063,190	32,063,190	0	20,039,490	20,039,490	100%
NAWS Lansford Reservoir/Pump Station Design	0	0	0	0	0	0	65%
NAWS Lansford Reservoir/Pump Station Construction	4,200,000	7,800,000	12,000,000	1,456,730	2,705,370	4,162,100	65%
NAWS Minot Phase III WTP Design	0	0	0	0	0	0	65%
NAWS Minot Phase III WTP Construction	0	0	0	2,467,780	4,583,020	7,050,800	65%
NAWS South Prairie Reservoir Design	287,520	533,980	821,500	0	0	0	65%
NAWS South Prairie Reservoir Construction	0	0	0	3,212,470	5,966,030	9,178,500	65%
NAWS Bottineau/All Seasons Pumps and Storage Construction	0	0	0	2,626,990	4,878,710	7,505,700	65%
NAWS Supply System Evaluation and Initiation	0	0	0	875,000	1,625,000	2,500,000	65%
	0	0	0	0	0	0	60%
All Seasons Water Users District System 1 Expansion-Design	0	0	0	0	0	0	75%
All Seasons Water Users District System 1 Expansion-Const	1,507,945	4,523,830	6,031,775	4,523,835	13,571,490	18,095,325	75%
Administration (BOR/GDCD/SWC)	26,225	756,167	782,393	27,012	778,852	805,864	
Total	$9,990,970	$53,048,687	$63,039,658	$16,244,157	$56,106,022	$72,350,179	

Appendix F

Northwest Area Water Supply (NAWS)





Drawing name: P:\3600\3064.000 - ALL SEASONS\outcast\3064.002 Bottineau Expansion\Plan Set\3064.002 Exhibit.dwg Layout name: Bottineau Cty Plotted by: BDM00439 Plotted on: Jan 07, 2011 - 1:49pm

DATE | DESCRIPTION | REV. DATE

BARTLETT & WEST

ALL SEASONS WATER USERS DISTRICT
BOTTINEAU COUNTY EXPANSION

EXPANSION LOCATION MAP

DESIGNED BY:	LJK
DRAWN BY:	DDM
APPROVED BY:	LJK
DESIGN PROJ:	3064.002
CONST PROJ:	---
SCALE:	AS NOTED
DATE:	01/11
SHEET NUMBER	1
OF	1

HoustonEngineering Inc. Bismarck Office 701.323.0200 701.323.0300
3712 Lockport Street Bismarck ND 58503

January 15, 2018

Tim Freije, PE
North Dakota State Water Commission
900 East Boulevard Avenue
Bismarck, ND 58505

Subject: Bid Review Opinion
Contract 7-1B
Northwest Area Water Supply (NAWS) Project

Dear Tim:

Please note the following in regard to the referenced project.

BID SUMMARY:

The Advertisement for Bids and Bid Form listed four (4) schedules per the NDCC requirements for individual prime bids for General, Mechanical, and Electrical (Schedules A-C) and a Combined General, Mechanical, and Electrical (Schedule D) for the referenced project. Bids were received and opened on December 21, 2017 for the following by schedule:

Schedule A –	Contract 1: General Construction
Bids Received:	Rice Lake Construction Group, Deerwood, MN
Schedule B –	Contract 2: Mechanical Construction
Bids Received:	None
Schedule C –	Contract 3: Electrical Construction
Bids Received:	Muth Electric, Inc., Watertown, SD
	CEI Electrical Contractors, Colstrip, MT
Schedule D –	Contract 4: Combined General, Mechanical, and Electrical Construction
Bids Received:	PKG Contracting, Inc., Fargo, ND
	Rice Lake Construction Group, Deerwood, MN
	Swanberg Construction, Inc., Valley City, ND
	John T. Jones Construction Co., Fargo, ND

As there were no bids received for Schedule B – Contract 2: Mechanical Construction, and the estimated cost of that Work was approximately two orders of magnitude higher than the $ 150,000 negotiation limit established in NDCC 48-012.-06, consideration of award to Multiple Primes would

not be possible and therefore this review focuses on the Schedule D – Contract 4: Combined General, Mechanical, and Electrical bids.

BIDDING INFORMATION REVIEW:

The four bids opened for Schedule D – Contract 4 were (1) PKG Contracting, Inc.; (2) Rice Lake Construction Co.; (3) Swanberg Construction, Inc.; and John T. Jones Construction Co. A summary of each bidder's information provided is as follows:

PKG Contracting, Inc.

1) No irregularities were noted in the Bid Bond or Acknowledgement of Surety
2) A North Dakota Class A Contractors License Certificate of Renewal was provided.
3) Receipt of Addendum 1 through 3 was acknowledged.
4) The EJCDC C-451 Qualifications Statement was provided.
5) The Non-Collusion Affidavit was provided.
6) The list of subcontractors and suppliers was provided.

Rice Lake Construction Co.

1) No irregularities were noted in the Bid Bond or Acknowledgement of Surety
2) A North Dakota Class A Contractors License Certificate of Renewal was provided.
3) Receipt of Addendum 1 through 3 was acknowledged.
4) The EJCDC C-451 Qualifications Statement was provided.
5) The Non-Collusion Affidavit was provided.
6) The list of subcontractors and suppliers was provided.

Swanberg Construction, Inc.

1) No irregularities were noted in the Bid Bond or Acknowledgement of Surety
2) A North Dakota Class A Contractors License Certificate of Renewal was provided.
3) Receipt of Addendum 1 through 3 was acknowledged.
4) The EJCDC C-451 Qualifications Statement was provided.
5) The Non-Collusion Affidavit was provided.
6) The list of subcontractors and suppliers was provided.

John T. Jones Construction Co.

1) No irregularities were noted in the Bid Bond or Acknowledgement of Surety
2) A North Dakota Class A Contractors License Certificate of Renewal was provided.
3) Receipt of Addendum 1 through 3 was acknowledged.

4) Item 12 – Safety Program for the EJCDC C-451 Qualifications Statement was not provided.
5) The Non-Collusion Affidavit was provided.
6) The list of subcontractors and suppliers was provided.

BID SUMMARY:

Bid tabulation was performed to verify mathematical accuracy of total prices versus unit prices (where used) to determine any discrepancies. No unit price multiplication discrepancies were noted on the bids; however, mathematical errors were noted in the bids provided by PKG Contracting and Swanberg Construction that were not the result of extending unit prices multiplied by number of units. The bid summary is presented as follows:

		Contractor			
	ENGINEER'S OPCC	PKG Contracting, Inc. Fargo, ND	Rice Lake Construction Co. Deerwood, MN	Swanberg Construction, Inc. Valley City, ND	John T. Jones Construction Co. Fargo, ND
Base Bid	$21,310,555.00	$21,969,000.00	$22,934,977.05	$ 4,787,876.00	$29,248,000.00
Alt. A-1	$ 15,000.00	$ 13,800.00	$ 18,000.00	$ 18,600.00	$ 25,200.00
Alt. A-2	$ 200,000.00	$ 248,000.00	$ 241,000.00	$ 220,000.00	$ 200,000.00
Alt. A-3	$ 250,000.00	$ 300,000.00	$ 293,000.00	$ 295,000.00	$ 200,000.00
Alt. A-4	$ 75,000.00	$ 173,500.00	$ 243,000.00	$ 70,000.00	$ 250,000.00
Alt. A-5	$ 1,165,000.00	$ 1,127,000.00	$ 1,762,001.00	$ 1,735,000.00	$ 957,000.00
Alt. A-6	$ 1,165,000.00	$ 1,099,000.00	$ 1,806,001.00	$ 1,834,000.00	$ 990,100.00
Alt. A-7	$ 3,000,000.00	$ 3,500,000.00	$ 3,570,000.00	$ 3,000,000.00	$ 3,260,000.00
Alt. A-8	$ 3,000,000.00	$ 3,140,000.00	$ 3,615,000.00	$ 3,200,000.00	$ 3,550,000.00

The obvious error in the Swanberg Construction, Inc. bid price was identified upon opening the bids. However, as this error was not the result of a multiplication error on unit prices as stated in the Instructions for Bidders as the controlling factor, in my opinion this falls into the category of a discrepancy involving price that may not be waived by the Owner. Further, from a practical standpoint, agreeing to the award of a bid that contains a roughly $20,000,000.00 error would not be acceptable to the Contractor. Although a signed request was not received from Swanberg Construction to withdraw the bid due to a material error within 24 hours per 16.03 of the Instructions to Bidders, the bid form itself states that the total bid price in words shall match the numbers with the written amount controlling and the written total was unfinished and did not match the numbers. Based on my review of this bid, it is non-responsive solely on the basis that the written amount of the bid is uncompleted let alone an obvious mistake.

The error noted in the PKG Contracting bid was that the bid price for the Mechanical - HVAC equipment price entered apparently was missing an additional zero. As this was not a unit price, we did not make that correction. However, the total bid price in numbers matched the total bid price in words, and based on the total it is apparent that PKG Contracting did not carry the Mechanical – HVAC line item error through to the total base bid. Therefore, this error does not qualify as a discrepancy to be waived that affects total bid price; it is a non-issue and PKG's bid is responsive.

BID ASSESSMENT:

Three of the four bidders – PKG Contracting, Swanberg Construction, and John T. Jones –have historically performed the same type of work for the NDSWC that is encompassed within these Schedules, in addition to extensive personal experience with all the submitting contractors on multiple projects. The documentation provided in the EJCDC C-451 Qualifications Statement and prior experience obviates the need for extensive credential verification, although the John T. Jones C-451 was incomplete.

A meeting with NDSWC, City of Minot, and HEI staff was held on Friday, January 5 to review the alternate bid prices received for specific project elements. A memorandum (attached) was prepared to further identify and discuss the reasons for bidding portions of the project as additive alternates as well as analysis of the alternates from a life cycle cost basis to provide a detailed basis for selection not solely related to bid price. If the sole basis of selection were bid price, the alternates would have been included in the Base Bid and listed as equivalent. The alternate process has also emerged as a method to maintain competitive bidding rather than sole sourcing specific equipment and products.

It should be noted that regardless of the alternates selected, PKG Contracting, Inc. would still be the lowest responsive, responsible bid received for the project compared to Rice Lake Construction and John T. Jones; further, PKG's bid was also lower than Swanberg Construction even considering corrected totals on the base bid and any alternates selected. Based on the discussion and review of the alternates on the January 5 meeting, the following were selected to include as the basis of award.

(1)	Alternate A-3 Vacuum Jacketed Storage Tank	$ 300,000.00
(2)	Alternate A-6 Francis Turbine Power Generation System	$ 1,099,000.00
(3)	Alternate A-7 RDP Lime Slaking System	$ 3,500,000.00

The total Base Bid plus selected Alternates = $ 26,868,000.00

SUMMARY:

Based on the bid review and evaluation of alternates selected, my opinion to the North Dakota State Water Commission is to recommend award of Schedule D – Contract 4: Combined General, Mechanical, and Electrical Construction for NAWS Contract 7-1B - Phase II Improvements of the Minot Water Treatment Facility to PKG Contracting, Inc. in the amount of $ 26,868,000.00.

If you have any questions or require additional information, please contact me at (701) 323-0200 or by e-mail at kmartin@houstoneng.com .

Sincerely,

HOUSTON ENGINEERING, INC.

Kevin E. Martin, PE
Principal/Sr. Project Manager

Attachment (1)

MEMORANDUM

To: Tim Freije, PE – NAWS Project Manager; Dan Jonasson – Minot Public Works Director

From: Alan J. Kemmet, PE

Subject: NAWS Minot Water Treatment Facility Phase II Improvements

Date: January 15, 2018

Project: 3553-074

INTRODUCTION

This Memo serves as an analysis of received bid prices as compared to cost estimates for the above referenced project. The project involves construction of a new Primary Treatment Building at the Minot Water Treatment Facility to enable treatment of current and future groundwater and surface water sources. The Primary Treatment Building will house two 9 Million Gallon per Day (MGD) solids contact clarifiers with recarbonation, new chemical feed facilities and storage for lime, coagulant, polymer, chlorine, as well as new laboratory, break room, and IT facilities.

The project bid package included four (4) contract schedules with two (2) possible combinations to consider for award: three individual Prime awards for Contract 1 – General Construction, Contract 2 – Mechanical Construction, Contract 3 – Electrical Construction, or a single Prime award for Contract 4 – Combined General, Mechanical, and Electrical Construction. Bids were received on December 21, 2017 at 2:30 p.m. for the project. As there were no bids received for Contract 2, any combination of contracts other than Contract 4 – Combined General, Mechanical, and Electrical is null.

The bid schedule for Contract 4 included eight (8) alternate bid items. Several of these alternates were comparative alternates, including Alternates A-2 and A-3 comparing urethane insulated vs vacuum jacket insulated CO2 storage tanks, A-5 and A-6 comparing two types of hydro power generation systems, and A-7 and A-8 comparing two types of slaking system. Alternates A-1 (sod substituted for seeding) and A-4 (spray coating insulation substituted for conventional pipe insulation) are strictly additive alternates.

BACKGROUND

OPCC: The Project Team generated an Opinion of Probable Construction Cost (OPCC) for the 7-1B project using research for project items from known material and labor costs, recent projects completed in the same area as this project, and historical trends in the construction industry. Because of funding agency restrictions, no contingency was allowed but normally would range from 10% to 15% for this size of project if used. The final OPCC was $24,500,000 for the base project including Lime System and CO2 Storage System alternates, or $25,675,555 for the base project plus the power generation system. While these estimates were completed with as much background information as possible, the size and complexity of the project along with the volatility of the construction market make it very difficult to predict the accuracy of an estimate with any certainty, with some recent projects in the state receiving low bids that vary from the project estimates by as much as 40%.

Modifications and Addenda: There were modifications and additions to the project scope that impacted the project costs at the 90% review meeting, and some of these changes were overlooked in the final OPCC. The largest change in cost was the decision to change the clarifier mechanisms from coated steel to stainless steel. This change was not incorporated into the original bid documents or OPCC but was added by addendum during the bidding process. Other smaller changes that were overlooked in the OPCC were cash allowances for laboratory, IT, SCADA, and conference/break room equipment and furniture; and new chlorine analyzer equipment requested after the OPCC was completed. All of these items were incorporated through addendum.

Bids Received: Four bids were received for the project. Each bid was summed with the alternates we assume will be selected for the project to determine each Contractors' total contract cost. The alternate items selected for the determination of the total contract cost were A-3: Vacuum Jacket Insulated Carbon Dioxide Storage Tank, A-6: Power Generation System – Francis Turbines, and A-7: RDP Lime Slaking System. The OPCC was also determined using the same combination of alternate items. Note that these numbers do not indicate selected alternatives but the equipment that was the original basis of design for comparison purposes, the final selected alternates will impact the total project cost from what is shown below but would not affect the order of bids. A summary of the bids opened in order from lowest to highest is as follows:

NAWS CONTRACT 7-1B		
Contractor	Total Contract Cost (with Alternates)	Percent Greater than OPCC
PKG Contracting, Inc.	$26,868,000.00	4.5%
Rice Lake Construction	$28,603,978.05	11.2%
Swanberg Construction*	$29,416,876.85	14.3%
John T. Jones Construction	$33,698,100.00	31.0%
Engineer's OPCC	**$25,725,555.00**	
* Bid was not considered responsive but has been included for comparison purposes		

Alternates: The eight alternate items included in Contract 4 were used primarily to promote competition. The carbon dioxide storage tank, power generation system, and lime slaking system alternate items account for 13 – 20% of the total contract cost for each bid. During most of the project design period these items had the potential to be single sourced items to meet the water plant and design requirements. The goal of allowing alternate equipment to be bid as comparative alternates with the original basis of design equipment was to promote competition and see the true cost difference between competing designs.

SPECIFIC PROJECT ELEMENT ANALYSIS

Additive Alternate A-1: Alternate A-1 would substitute sod for hydro mulch seeding. Because the overall green space to be seeded is minimal this alternate would eliminate some of the maintenance issues associated with weeds and coverage. The drawback of using sod is the lack of a permanent irrigation system, so regular watering would be a major concern both during the initial placement and owner maintenance after the establishment period.

Additive Alternate A-4: Alternate A-4 would substitute a protective coating/insulation product for the base bid conventional pipe coatings and adhesive insulation. This coating system has the advantage of eliminating or reducing condensation potential while preventing any moisture buildup under the insulation. This alternate was estimated as an approximately $75,000 addition but the low bid had a $173,500 price for this item which may not provide the value needed to justify this adder.

Phase II vs Phase III Project Elements: Phase III improvements of the Minot Water Treatment Facility are still planned for the near future, however these improvements could not be included in the Phase II design due to ongoing litigation and an injunction on construction that would expand the treatment facility. While this injunction has since been lifted, Phase II only replaced the existing primary treatment capacity as in-place replacement of this aging infrastructure was not possible. While the start date of Phase III is unknown, the nature of the project as a complete retrofit of the existing primary treatment and occupied areas of the plant will make it very difficult to maintain normal operations for the plant staff. Since extra space was available on the main floor of the new building due to the location of the process elements, Phase III planned upgrades such as a laboratory, breakroom, conference room, and IT room along with the associated Architectural, HVAC, Plumbing, and Electrical modifications for these facilities were added to the Phase II project to provide staff with occupied space while the Phase III project is completed. While these items were largely accounted for in the project estimates, they did impose occupancy issues on the entire treatment wing and contributed to a higher overall project cost than originally anticipated.

Clarifier Construction: Coated carbon steel was the original basis of design for clarifier mechanisms to reduce capital cost of the project, however stainless steel was ultimately selected for the solids contact clarifiers to provide longevity of this critical equipment in the Primary Treatment Facility. This selection was made late in the project design after discussion of the design life and potential issues with re-coating operations. While stainless offers little to no maintenance costs to achieve the 50-year design life of the clarifiers, this long design life would likely require 3 recoat operations with carbon steel. Recoat costs for carbon steel clarifiers are high due to the difficulty of prepping and coating the fully assembled equipment, containing the blasting operation, disposing of waste, and limiting staff exposure to VOCs. Plant capacity was also a concern as the complete re-coat operation for a clarifier can take several months. The following life-cycle analysis compares the total cost of ownership for the differing construction materials, note that operation and maintenance costs other than coatings and wear part replacement have been excluded as these numbers should be nearly identical for either mechanism.

Clarifier Life Cycle Analysis (2 Clarifiers)

Equipment	Carbon Steel Coated	Stainless Steel
Capital Cost (Low Bid)	$1,100,000	$1,700,000
Expected Life (Turbines)	50 years	50 years
Coatings	15 years	N/A
Wear Parts	25 years	25 years
Coatings Cost	$100,000	N/A
Wear Parts	$25,000	$45,000
Life Cycle Cost	$2,038,624	$1,991,495

Ongoing Plant Access and Operations: One critical requirement during construction of the Primary Treatment Facility is keeping the existing facility in service. The Contractor must provide access for deliveries and staff, especially carbon dioxide and lime deliveries which can occur multiple times per week. To maintain access for carbon dioxide delivery, a shoring system may be necessary during excavation of the primary treatment building foundation which would add significant cost to the foundation construction bid item. The contractor is also required to keep shutdowns to a maximum of 8 hours unless previously approved, and while longer shutdowns are certainly possible, the duration of these shutdowns will be limited by demands and this may have contributed to inflated bid prices.

Lime System: The basis of design for the lime system was a redundant storage, slaking, aging, and circulation system based on the RDP Tekkem Design as preferred by the City of Minot. An or-equal request was received from Merrick Industries during bidding and several complaints were received that the possible sole-sourcing of this equipment could negatively impact bid prices. The Merrick or-equal request was determined not to be an actual equal to the RDP as specified. Merrick claimed that the system was capable of meeting the performance requirements and the differences were largely in concept and location of grit removal and location/use of load cells. Due to the physical differences of the systems, it was decided to not re-write the specification and allow this alternate product to be bid as an equal, but rather maintain competition in bidding by pulling the entire lime system out of the base bid as two comparative additive alternates. The goal of this alternate setup was to eliminate any "packaging" of equipment around a sole-sourced item, promote competition in pricing, and allowing selection without price being the only factor as it would have been with an or-equal situation. The Merrick system ($3,140,000) was approximately 10% or $360,000 lower than the RDP system ($3,500,000) on the low bid, but on the other three combined bids the RDP system was bid lower, which raises uncertainty as to how the equipment price was balanced among bids. Both systems claim to meet the performance and operational requirements of the system. The one apparent advantage of the Merrick system is the location of the grit removal integral to the slaker, allowing gravity flow from the slaker to the grit removal to the aging tank. Comparatively, the RDP system requires pumping of the slaked slurry to the grit removal, along with grit traps at each injection point and recirculation of the slurry through the grit removal before being returned to the aging tank. The RDP system has several advantages, including all equipment being accounted for in the original design for structural, mechanical, and electrical systems; many more installations of batch feed equipment; and being the preferred system of the City of Minot. While Merrick is a reputable lime system supplier, this type of Merrick system is not familiar to the design team, is not in wide spread use for water treatment facilities, and would require additional investigation by the NDSWC, City of Minot, and the Technical Team prior to award. A life cycle analysis is not warranted for this decision as both systems are expected to have very similar operation and maintenance costs, leaving capital cost as the main variable where costs are concerned.

Chemicals Supplied: As part of the contract for construction of the Primary Treatment Facility the Contractor is required to provide chemicals necessary for startup and commissioning. The required chemicals and amounts are one (1) bulk tank of primary coagulant, two (2) 55-gallon drums of liquid polymer, two (2) silos of quicklime, ten (10) one-ton cylinders of chlorine gas, and one (1) bulk tank of

carbon dioxide. The costs for these chemicals were omitted from the OPCC because the costs are dependent on the market value of these chemicals at the time of project completion in late 2019.

Carbon Dioxide Feed Systems: The carbon dioxide feed system was pulled from the contract by addendum as it became clear prior to the bid date that only one manufacturer would be able to supply the equipment. With no substitution requests received this would be an effective sole sourcing of this equipment. The carbon dioxide feed equipment will be acquired through procurement during construction to allow multiple systems to be compared.

Carbon Dioxide Storage Systems: There were two alternate items included in Contract 4 for the carbon dioxide storage tank. The urethane insulated carbon dioxide storage tank was the lowest cost alternate for the low bid and nearly all bids. With the vacuum jacketed insulation alternate was bid $52,000 or 20% higher than the urethane insulation option, a 50-year life cycle cost analysis indicates that because of the more resilient insulation system and the smaller refrigeration unit required, the vacuum jacket insulated tank has a higher capital cost but a slightly lower overall cost of ownership. Alternatively, the vacuum jacketed tank manufacturer has indicated that several of the specification provisions that they were required to meet would not be necessary for a vacuum jacketed tank, specifically the requirement for schedule 80 stainless steel piping that is exposed on a urethane insulated tank would instead be inside the vacuum jacket on a vacuum tank. The manufacturer would normally provide as lower schedule stainless to allow shop bending instead of fabrication during manufacturing. The cost of this item is estimated at $48,000, so if deducted after award the capital cost of the units would be nearly identical and the life cycle cost of the vacuum insulated tank would be much lower. While a refrigeration system was included for both types of tank, it may not be necessary or could be reduced in size for the vacuum jacketed tank and may need to be increased in size for the urethane insulated tank. The following life cycle analysis was performed for the tank options, and again does not include labor costs that will be very similar for either unit.

Carbon Dioxide Storage Tank Life Cycle Analysis

Equipment	Urethane Insulation	Vacuum Jacketed Insulation
Capital Cost (Low Bid)	$248,000	$300,000
Expected Life (Tank)	50 years	50 years
Insulation	25 years	50 years
Refrigeration	15 years	15 years
Refrigeration Unit Replacement	$15,000	$10,000
Insulation Replacement	$35,000	$45,000
Life Cycle Cost	$627,000	$610,722

Power Generation System: The original bid documents included a power generation system based on Reaction Style Hydro Turbines. An alternative Francis Turbine design had been considered during design that performs much better under variable flow rates and had a simpler control system, but was eliminated based on total power recovery efficiency provided by the manufacturers. It was later discovered that the efficiencies for the Francis Turbines included the generator unit efficiency while the Reaction Turbine efficiencies did not. After these efficiencies were corrected and re-evaluated, the potential recovery for the two types of turbines were very similar albeit with different configurations. As a result, there were two alternate configurations designed that were estimated to be very equal in overall cost and performance. The power generation system design required the reaction turbine option have three turbines with space for a fourth whereas the Francis turbine option required two turbines with space for a third. The Francis Turbine option had a higher overall equipment price but requires less piping and valving over the Reaction Turbine option which was reflected in the Electrical and Mechanical bid prices of the low bid package. The bid price difference between these options was between 2 – 6% on all bids received. Preliminary life cycle cost vs revenue analysis indicates that at historical flows (2012-2015) either of these systems are capable of repaying the capital investment, operation, and maintenance costs in a little over a decade, while higher flows would speed this recovery significantly. The figures shown for expected recovery 15 years in the future are using projected flows based on steady growth rate and full NAWS buildout. These figures also assume the purchase of the extra turbine for either system prior to 15 years, but it should be noted that these additional turbines are not necessary until the system demand exceeds 15 MGD for at least 25-50% of the year.

Power Generation System Cost and Revenue Comparison

Equipment	Reaction Turbines	Francis Turbines
Capital Cost (Low Bid)	$1,127,000	$1,099,000
Expected Life (Turbines)	30 years	30 years
Wear Parts	5 years	5 years
O&M per Week	2.5 hrs	2 hrs
Annual O&M labor Costs	$7,800	$6,240
Annual Parts Costs	$5,000	$5,000
Annual Recovery @ 2012-2015 average (Historical Flows, $0.08/kWh)	1,364,798 kWh $109,183.84	1,456,326 kWh $116,506.08
Time to positive revenue (Historical Flows)	11.5 years	10.4 years
Cost to add extra turbine (2017 dollars)	$300,000.00	$400,000.00
Annual Recovery @ 15 years (Projected Flows, $0.10/kWh)	3,064,438 kWh $306,443.80	3,185,460 kWh $318,546.00

CONCLUSIONS

The conclusions drawn from the preceding analysis are the product of multiple decisions based on criteria developed and presented as part of the Basis of Design report that, necessarily and normally, were adjusted and amended throughout the final design phase. Input from and decisions by the NDSWC staff, City of Minot staff, and Technical Team working together formed the framework for the bidding documents that were ultimately responded to by interested contractors. Based on the nature of the work to be performed, the bids received, and the analysis performed following receiving bids, the following conclusions were developed:

(1) Life cycle cost is the true cost associated with any infrastructure improvement, as maintenance and replacement cycles need to be incorporated to fully evaluate alternatives. While assumptions regarding maintenance frequency and cost may be argued and actual time in service may vary prior to incurring maintenance or replacement expenses, there is inherently less life cycle cost associated with systems requiring less maintenance and subsequently a longer service life, which also reduces the life cycle cost for the system.

(2) Competition in the bidding process is both a State and Federal requirement; "or-equals" must be included for specific products that may perform the same function or can meet the design intent of the project. Determining whether competing products are truly equivalent requires analysis and investigation from a technical and non-technical (i.e., service history, reliability, etc.) basis that varies in depth based on function and complexity. This process has become further confused as companies with competing products are acquired or merge, further reducing true competition and potentially skewing prices offered to contractors through bundling or packaging with a sole sourced product or system. Utilizing additive alternates for competing products or systems appears to be a successful way in theory and practice to maintain competition in the bidding process without jeopardizing overall bid prices due to packaged content.

(3) Consideration to planned future improvements in Phase III included laboratory, meeting, bathroom, and IT space being added to the Phase II project. Additional costs associated with this modification beyond the cost of walls, ceilings, fixtures, and finishes include the environmental control required for those spaces that significantly increased HVAC costs for the facility. The decision to add these spaces was based on the practicality related to operation of the entire water facility from the current control room, ability to maintain water production during construction of Phase III when renovation of the existing work spaces was originally identified, and the uncertainty associated with when the Phase III improvements will ultimately be constructed. As likely the last project phase of NAWS, it is unrealistic to expect efficient water facility operation when the operators are located in the wrong building for performing many of their required tasks for an extended period of time.

(4) The opportunity to recapture power from recent and future modifications to the water supply delivery system was considered for future implementation as part of capturing energy when Lake Sakakawea water would be supplied to the plant. However, the relocation of the Sundre supply system due to flood protection impacts mandated implementing the pressure reduction features required at the facility prior to receiving lake water. The analysis performed indicated that the repayment of the capital expense for the power generation system at approximately 10 years under recent demand projections. While this feature could be delayed until later in the NAWS

project cycle, there will be a lost opportunity cost to recover the capital investment for this infrastructure if implementation is delayed and the potential to defray operational expenses for the project through power recovery is significant motivation to proceed as soon as possible.

RECOMMENDATIONS

Based on review of the alternates by NDSWC staff, City of Minot staff, and the Technical Team through this financial analysis and Owner preferences, the following are recommended for alternate award:

(1) Alternate A-3 Vacuum Jacketed Storage Tank - $300,000.00

(2) Alternate A-6 Francis Turbine Power Generation System - $1,099,000.00

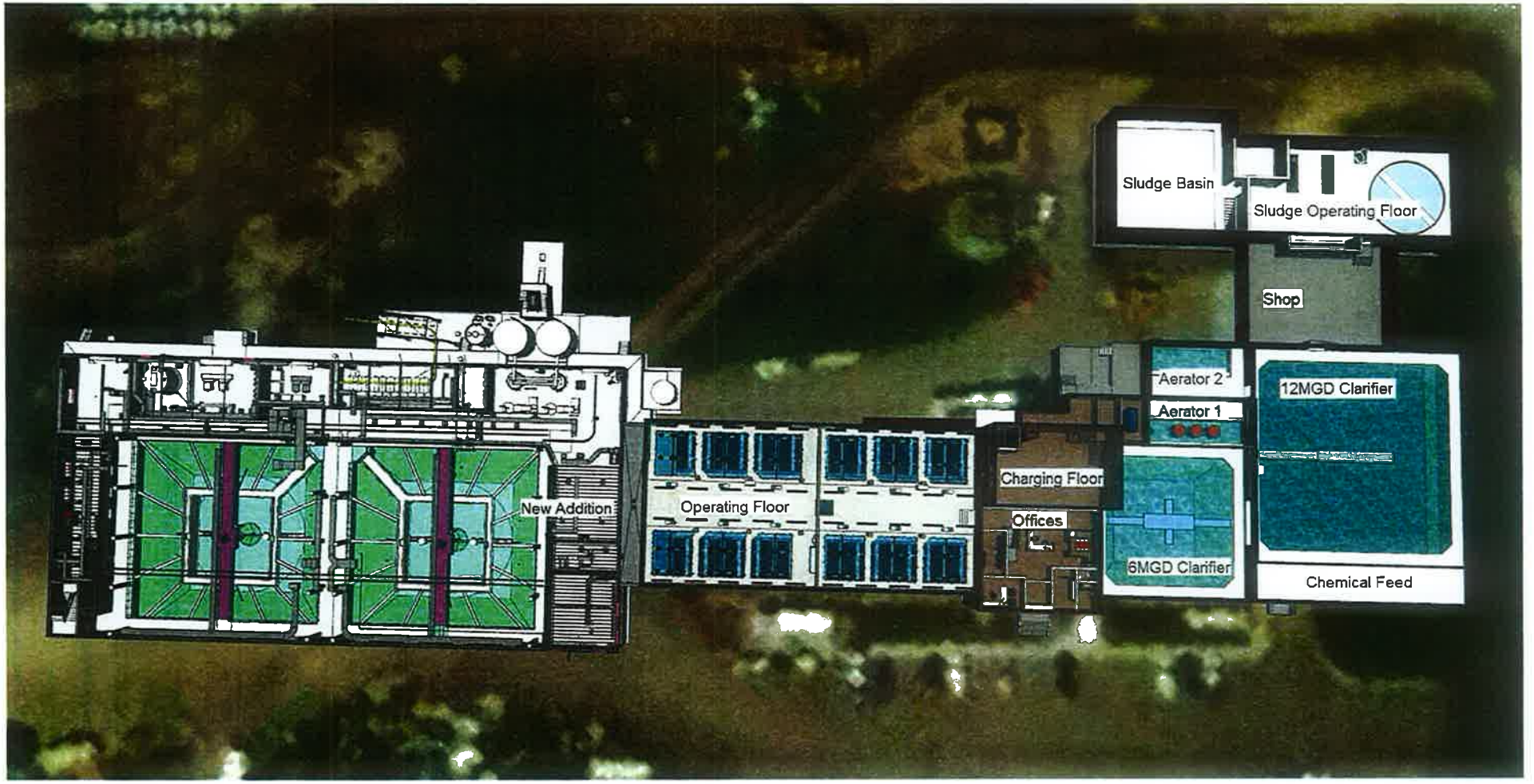
(3) Alternate A-7 RDP Lime Slaking System - $3,500,000.00

Total Contract (Base Bid plus Alternates) - $26,868,000.00

If there are any questions or concerns, please don't hesitate to contact us.

Regards,

Alan J. Kemmet, PE


Sludge Basin
Sludge Operating Floor
Shop
Aerator 2
Aerator 1
12MGD Clarifier
Charging Floor
Offices
6MGD Clarifier
Chemical Feed
New Addition
Operating Floor

Appendix H

A. State Water Commission - Subcommittee Proposal

1. Four subcommittees proposed:
    a. Water Supply Subcommittee*
    b. Flood Control Subcommittee*
    c. General Water Management Subcommittee+
    d. Rural Water Supply Subcommittee+

2. Water supply and flood control subcommittees have 4 members;

3. General water management and rural water supply have 3 members;

4. All subcommittees will evaluate applications or funding requests and make recommendations to the full commission; application sponsors may appear at subcommittee meetings to promote their application

5. Subcommittees will forward recommendations to SWC for consideration.

B. State Water Commission - Strategic Planning Proposal

1. Propose joint meeting of SWC and Water Topics Committee to do strategic planning
2. 50-year forecast
3. Identify other funding sources, both in-state and out of state

Appendix I

Effects of Weather Modification

Thank you for this opportunity to speak to you today.

My name is Jon Wert. I farm with my family near New England in Southwest North Dakota. We raise wheat, corn and canola. My daughter is in the 9th grade and my son is a senior and plans on attending BSC this fall and majoring in agronomy. His plan is to return to the farm and carry on the tradition.

In January of 2017 I had the opportunity to testify at a committee hearing on the water commission budget at the state capital. Much of what I have here today is from my testimony.

I would like to start by saying weather modification is an extremely important issue facing producers in our part of the state. It is a hot button issue because rainfall or lack thereof determines our success, our ability to continue the occupation we love that has been handed down to us from our hard working parents and grandparents. Whether or not we can continue to provide a living for our families and keep the farms and ranches going is largely determined by rainfall.

If one looks at the weather modification page of the water commission website, a case is laid out in support of cloud seeding. However, it reads like an infomercial full of propaganda and hyperbole. If I was on the water commission I would be extremely concerned with the person laying out the case in favor of the project. An honest portrayal instead should be presented.

If you just read the summary, as I'm sure most people do, one could easily be in favor of the system. I however have read the entirety of the studies listed on the webpage that is offered up as proof. Only because I and a majority of the producers in our area believe the claims don't stand to reason, they contradict common sense. What you will hear from most producers is that a storm will be heading our direction from Montana and that when the planes start seeding the clouds the storm dissipates and we receive little or no precipitation. This has been going on for years, even decades.

The website suggests the (Smith et al. 2004) and (Wise,2005) studies show there was an increase in rainfall of 4.2% to 9.2% more than the upwind control areas. But when one actually reads the studies they say something quite different to those paying attention to the detail. The Smith study concludes by saying "This analysis of the climatic rain gage data from the NDCMP target area and upwind control areas in eastern Montana has yielded no significant evidence of an effect of the NDCMP seeding on the summer-season rainfall in the target area. " The study when on to say " an analysis of wheat yield data suggested an increase of about 6% in the NDCMP target areas that could be attributed to the seeding activity" . The idea that the wheat yielding 6% higher in my area versus eastern Montana is because of cloud seeding is preposterous, and shows the lack of agronomic knowledge of the author. Soil quality alone would suggest a much larger difference.

The Wise study first discredits an earlier study by (Eddy et al.) which had found an increase in precipitation from seeding activity saying "the significant increase in precipitation could largely be due to the difference in intensity of the storms between the seed group and control group". But his study makes an even larger mistake by having the upwind control not upwind at all!

His upwind area is to the north of the target area, rendering his data useless. But to his credit he did acknowledge this by stating "Ideally, the control gauges would be located to the west of target regions for westerly winds." He goes on to recommend for future precipitation evaluations to use rainfall data from Montana immediately to the west for the upwind control. This is surprising given the fact that the studies before him had already done this basic concept.

Another study listed on the website is the (Johnson 1985) study. This study evaluated data from 7 years (1976-1982). Here again the website "cherry picked" only the data it wants the reader to see. It doesn't tell you the study says "mean rainfall in the target exceeded that in the control during 5 of the 7 years studied," So in 5 of the 7 years rainfall in the target exceeded the control. Keep in mind for every 50 miles east in North Dakota there is a 1" increase in precipitation. They are supposed to get more rainfall than eastern Montana. But my argument of decreasing rainfall downwind is explained by him saying "and exceeded the downwind rainfall in 4 years." So in 4 of the 7 years (nearly 60%) of the time the target area received more rainfall than downwind when it should not be. In his conclusions all his points are listed as weak evidence except one: (6) Evidence of an increase downwind (relative to the target and the control) on days with relatively light rain in both the target and the control. Guess what? These are the days no cloud seeding is done.

He also states: "If seeding primarily for rain enhancement within this project has had any effect it has escaped this analysis" He goes on to say: "Indeed, the evidence of a seeding effect (on rainfall) from the hail suppression seeding is not strong. Certainly no claim of a "proof" or of irrefutable evidence is rendered."

His final conclusion is that "No evidence of the effectiveness of seeding for rainfall increases was found." Interesting statements from a study that is listed on the Water Commission website as proof cloud seeding works.

The last study was listed under the crop hail evaluation tab. It was a study by Smith et al, 1997. In describing the cloud seeding process it states: "10) Many multi cell thunderstorms feed on moist boundary layer air, usually drawn in from the southern or eastern quadrants. The precipitation shaft that develops beneath the previously rain-free cloud base (the early rainout) may interfere with such inflow, reducing the "fuel supply" to the maturing cells (fuel starvation)." It goes on to say: "The mature updraft may be weakened by mass loading and possibly by fuel starvation. The environment is less favorable for the growth of hail, and less

damaging hail results. The rain shaft of the storm is broadened by early rainout. Measurable precipitation falls in some areas that otherwise would have remained rain-free. Other areas that would have received locally intense rain and hail receive less intense rain and significantly less hail damage." This is exactly what happens. We will receive the little rain described, usually .05" or .10" instead of the 1.00" we would have received. As any farmer will tell you the .05 or .10 rainfall does not benefit the crop at all. Our daily crop use rates in July are around .20" .So .05" or .10" of rainfall will not even get to the roots. 1.00" however, will feed the crop for 5 days. For every 1.00" additional rainfall equals 5 bushels of wheat.

The Texas Weather Modification Association website is at least honest when they admit: "Thus far, available evidence suggests that seeding for hail suppression, if anything, decreases, rather than increases, rainfall from seeded storms.

Since I testified last January at the capital showing the problems with using these studies to support weather modification the website has been updated with another study. This one is from 1975. It was based on 4 years worth of data (1969-1972). It states in results: "the result of Type 1 days show less rain on seed days than on no-seed days but the results fail to achieve statistical significance. The results for Type 2 days are also in-conclusive." The final type of days Type 3 he states "The pseudo rank-sum result for Type 3 das does not achieve a 10% significance level, although the pseudo chi-square test for number of rainfall event does so. The results can therefore be interpreted as supporting the Rapid Project findings for shower days but not conclusively." Lastly in his conclusions he states; "It is possible that rainfall from some hail- bearing cells is suppressed, but the NDPP results provide no evidence to this effect." Well I have evidence to this effect. The effect that he states is not only possible it is likely.

Knowing that our rainfall has decreased due to cloud seeding I set out to prove it. But I wanted more concrete data to bolster this argument. As the weather is highly variable I decided I needed long term data from many years if not decades to take out the variability. In fact the water commission website under "How do we determine the effects of seeding" states: "These evaluations require long-term relationships to be established between seeded and unseeded areas, and a long period of operations for comparison purposes." Unfortunately the evaluations offered as proof on the website are all short term studies with as little as 4 years worth of data.

I first gathered data from the 30 years prior to cloud seeding (1930-1960). This data was obtained from John Enz former state climatologist. I also gathered data from a book entitled "Climate Of North Dakota" written by North Dakota State Climatologist Ray E. Jensen which also uses data from the same time frame.

The book shows a map of my area (New England) receiving greater than 16 inches of precipitation, while the National Weather Service data from state climatalogist John Enz shows

17.1" to be exact. I decided to compare this average to the towns of Marmarth and Beach. Marmarth, because it lies only 5 miles east of the Montana line so any effect from cloud seeding would be minimal. I chose Beach because it lies to the north of the target area and only 2 miles from the Montana line so no effect is possible.

During the same time frame (1930-1960) Marmarth averaged 14.7" this is 2.4" less than New England. During this time frame Beach averaged 13.9" this is 3.2" less than New Englnad.

Fast forward to the most recent 30 year average:

New England now receives 15.8" a loss of 1.3".

Marmarth receives 15.5" a gain of .8" of precipitation.

Beach receives 15.23" a gain of 1.3".

Keep in mind this recent 30 year average was a wet 30 years in which the average location in North Dakota picked up 1.42". This would explain why Marmarth and Beach have .8" and 1.3" gain respectively. However it does not explain why New England has lost 1.3" other than being downwind of cloud seeding. This really is over a 2" loss because we should have increased our rainfall like the majority of the state. 2" of rainfall is equal to 10 bushels of wheat. Multiply that times $6.00/bu. and you have a loss of $60.00/acre!!

I then put all the data I received from Dr. Adnan Akyuz the current state climatologist into a spread sheet. This data compares the most recent 30 year average with the prior 30 year average to see what the change has been and where it has occurred.

Of the 136 locations across North Dakota there were 105 locations with a gain in precipitation with an average increase of 1.00". There were 31 locations with a loss of precipitation with an average loss of .48". I than plotted the locations with a loss of precipitation greater than 1% on a map. I then drew a yellow line around the areas that cloud seeding is done. I drew a green line around that area showing the 10 mile buffer zone where cloud seeding may also be done.

Nearly all the locations with a loss in precipitation, (depicted in red) lie within this area. Only 8 of the [redacted] locations did not lie in this area and those locations are slightly downwind except for New Salem. However, New Salem does lie 55 miles downwind, which is within the 90 mile downwind zone the water commission website says "up to 90 miles in extreme cases" an effect can occur.

I am also including a map I found from the National Weather Service showing July precipitation for the 30 years (1971-2000). It clearly shows my area receiving less precipitation than areas to

the west. This contradicts the rainfall average prior to cloud seeding and the normal increase as one moves from west to east.

Lastly the website offers a study by NDSU showing the increase in revenue to producers from weather modification. However, all the study does is put an economic value on rainfall increases of 5% and 10%, values given to them by the Atmospheric Resource Board based on studies I showed clearly don't support that result. Just like the CBO they only score what you give them. Under the 10% scenario they came up with a 16 million dollar gain per year from cloud seeding. However based on the data I compiled from the state climatologist we have **lost** over 10% of our rainfall. This suggests a greater than 16 million dollar loss per year! It is no wonder auction sales in our area are much more prevalent than young people coming back to the farm.

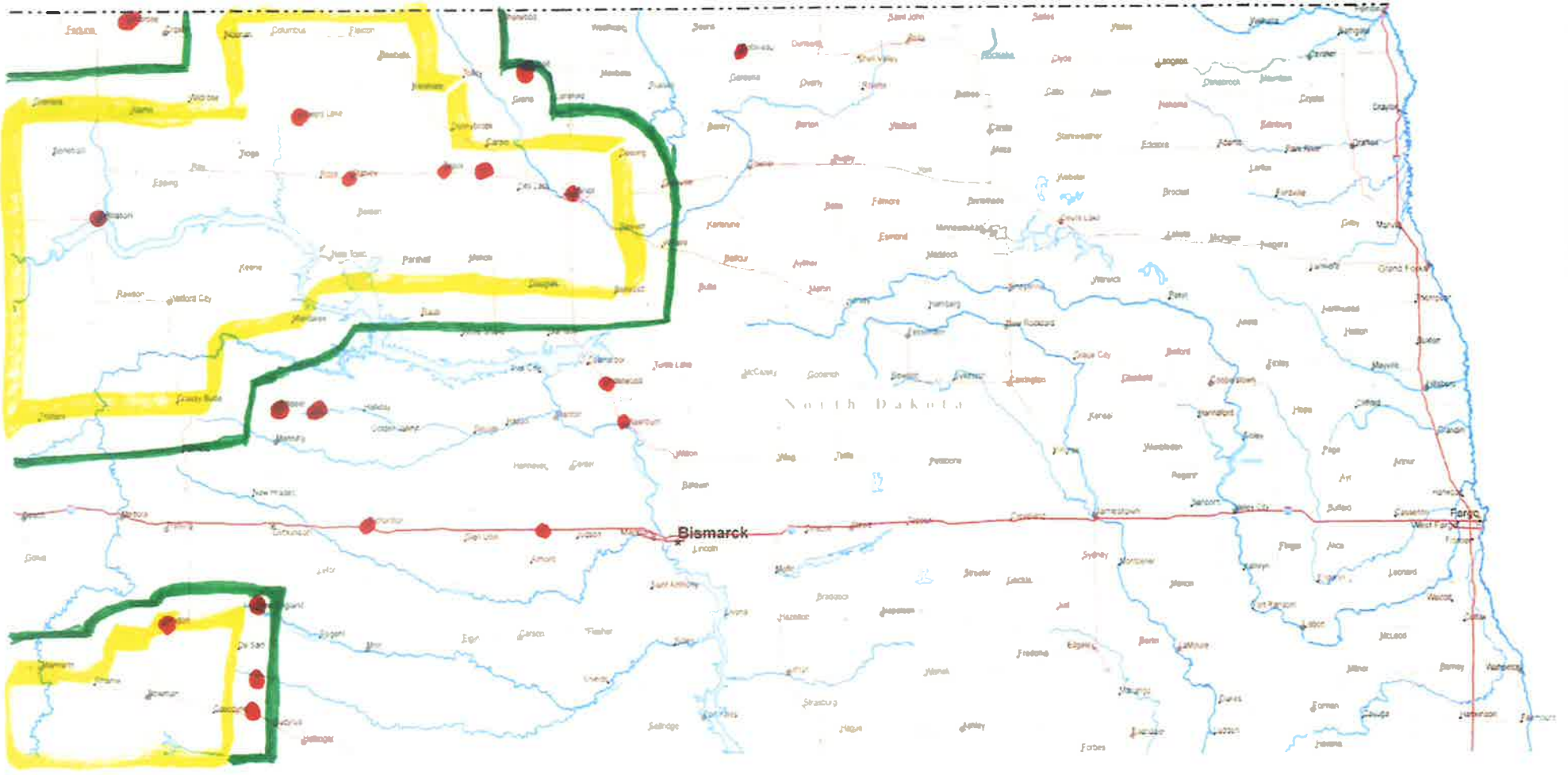
The website also states in the economic analysis the following: "The analysis of hail suppression activities shows the average crop value saved through cloud seeding (Table 6 in the report) is $3.7 million per year, which equates to $1.57 per planted acre." Every farmer I know will give up $1.57 per acre in hail loss to gain $60 an acre in increased production.

I can buy hail insurance to protect my farm from a loss from hail. But a year after year loss in rainfall cannot be insured unless the yield drops below my crop insurance guarantee of 65-70%. 2016 was a good example. We were short moisture and our yields were 30% below our average. We received no insurance check and paid a big premium showing our bankers a big loss. Many producers are not getting funding to farm another year. This could all be prevented.

I was told by a member of the committee I testified at last January on the water commission budget that it came out of committee with a unanimous vote to not fund the weather modification. However in the end when it went to the whole body the money was block granted allowing the water commission the discretion on how the money could be spent.

It's time for government to look out for the people.

- Locations with greater than 1% drop in precipitation



PROGRAMS, EVALUATIONS, ECONOMIC BENEFITS & COSTS

HOW CAN WE DETERMINE THE EFFECTS OF SEEDING?

Seeding effects and benefits can be demonstrated in a number of ways. The most direct method is to conduct a project over several years in which half of the storms are randomly seeded and the resulting precipitation from the seeded and unseeded storms is compared. From 2005-14, The Wyoming Weather Modification Pilot Program (WWMPP, 2014) accomplished this goal by setting up a randomized cloud seeding program to research and evaluate the enhancement of snowfall. The results point to an increase in snowfall of 5-15% during ideal seeding conditions. For other cloud seeding programs in the U.S., the problem is that project sponsors usually want all of the seedable clouds treated, not just half, to attain the maximum potential benefit from the program. In that scenario, evaluations using crop-hail insurance data, crop yield data, or rainfall and hail data are useful if done properly. These evaluations require long-term relationships to be established between seeded and unseeded areas, and a long period of operations for comparison purposes, but do not require that only half of the suitable clouds be treated.

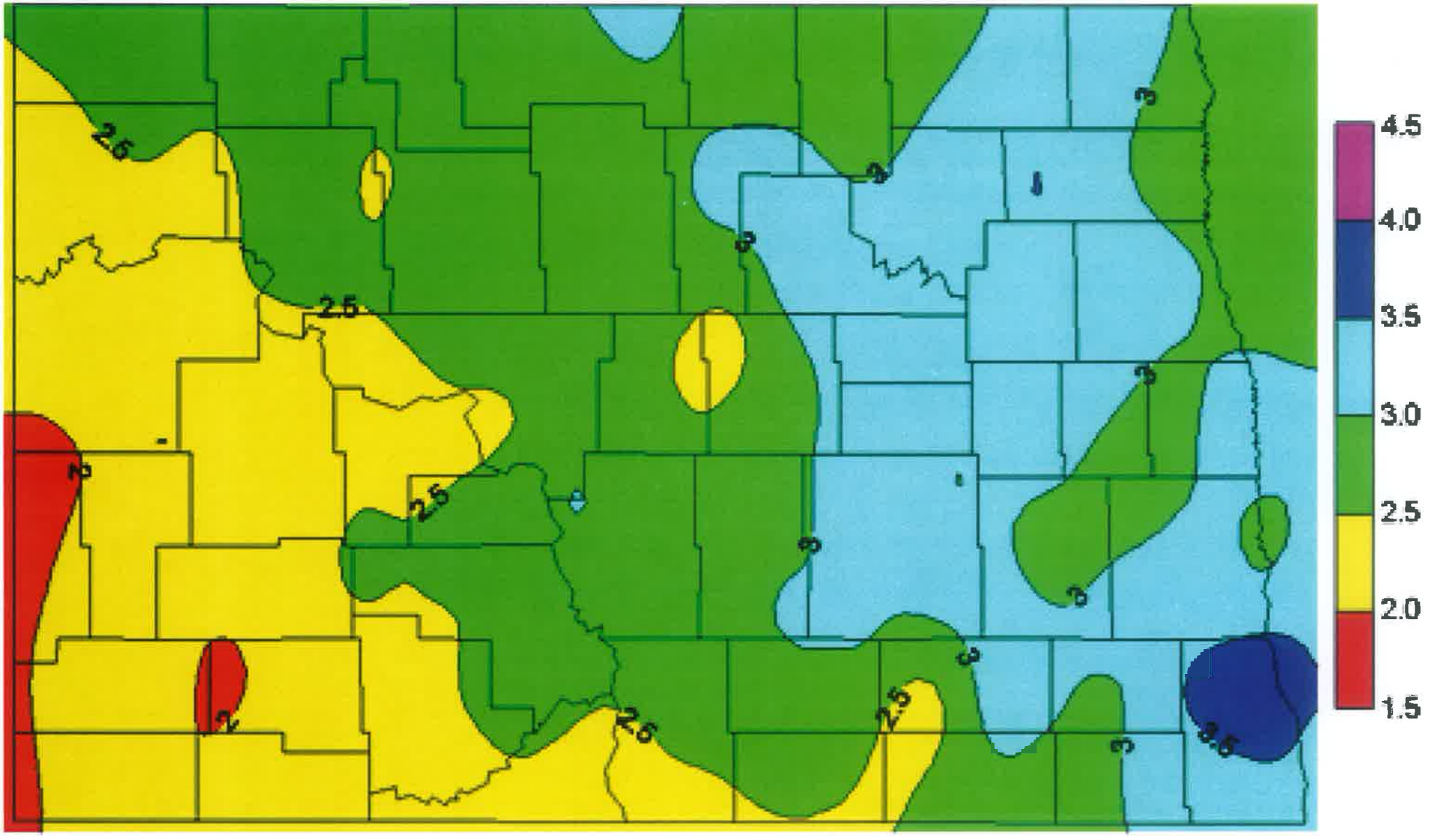
ARE THERE NORTH DAKOTA PROJECTS THAT HAVE DETERMINED THE EFFECTS OF SEEDING?

Yes. The first such effort, which built the foundation of cloud seeding in North Dakota was called the North Dakota Pilot Project (NDPP) (Miller et al., 1975). Conducted in McKenzie County from 1969-72 (Mountrail and Ward Counties also participated in 1972), the NDPP was a randomized experiment, which provided for the best possible statistical analysis of the results.

Experimental protocol set up eight-day blocks in advance of each project season where six days were randomly designated "seed" days and two were "no-seed" days. Following the four-year project, data from 67 rain gauges in McKenzie County were subjected to a variety of statistical tests to determine the seeding effects. ***Analysis of the data revealed strong evidence that silver iodide seeding of towering summertime clouds led to an increase in the frequency of rainfall events, an increase in the average rainfall per rainfall event, and an increase in the total rainfall in the seeded area.*** Further, the total potential rainfall increase for the area was estimated at one inch per growing season. ***Hail data from the NDPP showed less hail on seed days than on no-seed days and lower crop-hail insured losses on seed days versus no-seed days.***

North Dakota July 1971-2000 Normal Precipitation (inches)

(Data from NWS Cooperative Network)



ND State Climate Office

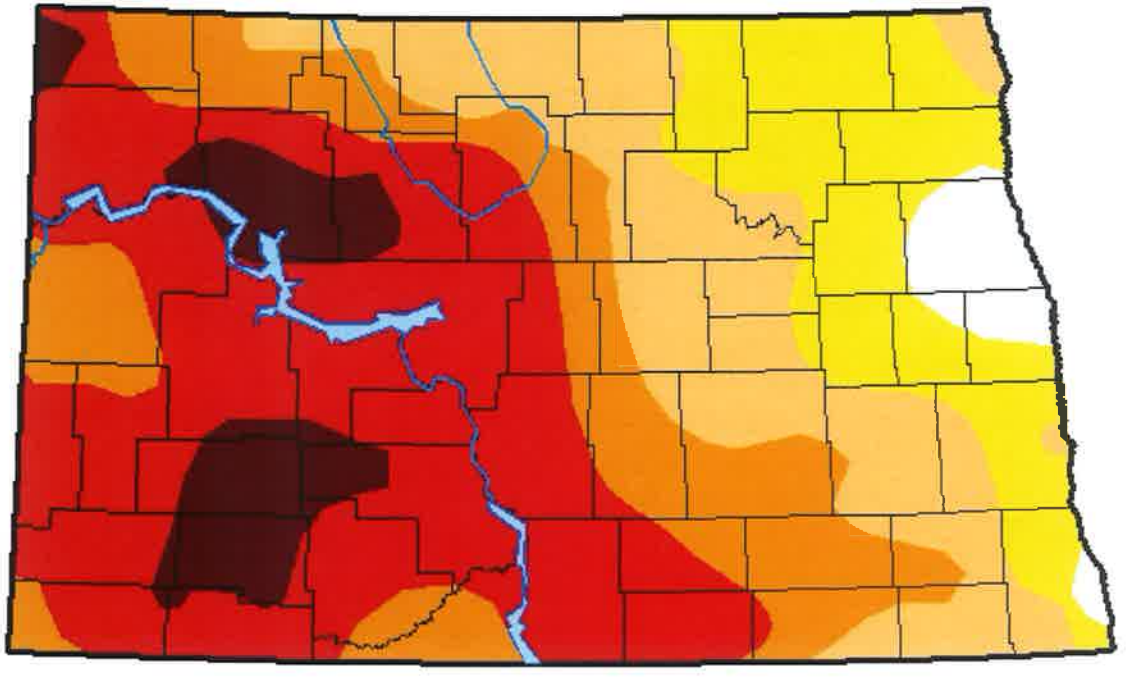
U.S. Drought Monitor

North Dakota

August 1, 2017

(Released Thursday, Aug. 3, 2017)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	3.09	96.91	81.74	62.45	44.09	7.62
Last Week 07-25-2017	6.61	93.39	79.21	61.16	45.56	7.62
3 Months Ago 05-02-2017	91.22	8.78	0.00	0.00	0.00	0.00
Start of Calendar Year 01-03-2017	93.87	6.13	0.00	0.00	0.00	0.00
Start of Water Year 09-27-2016	96.70	3.30	0.41	0.00	0.00	0.00
One Year Ago 08-02-2016	90.05	9.95	2.98	1.20	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Deborah Bathke
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

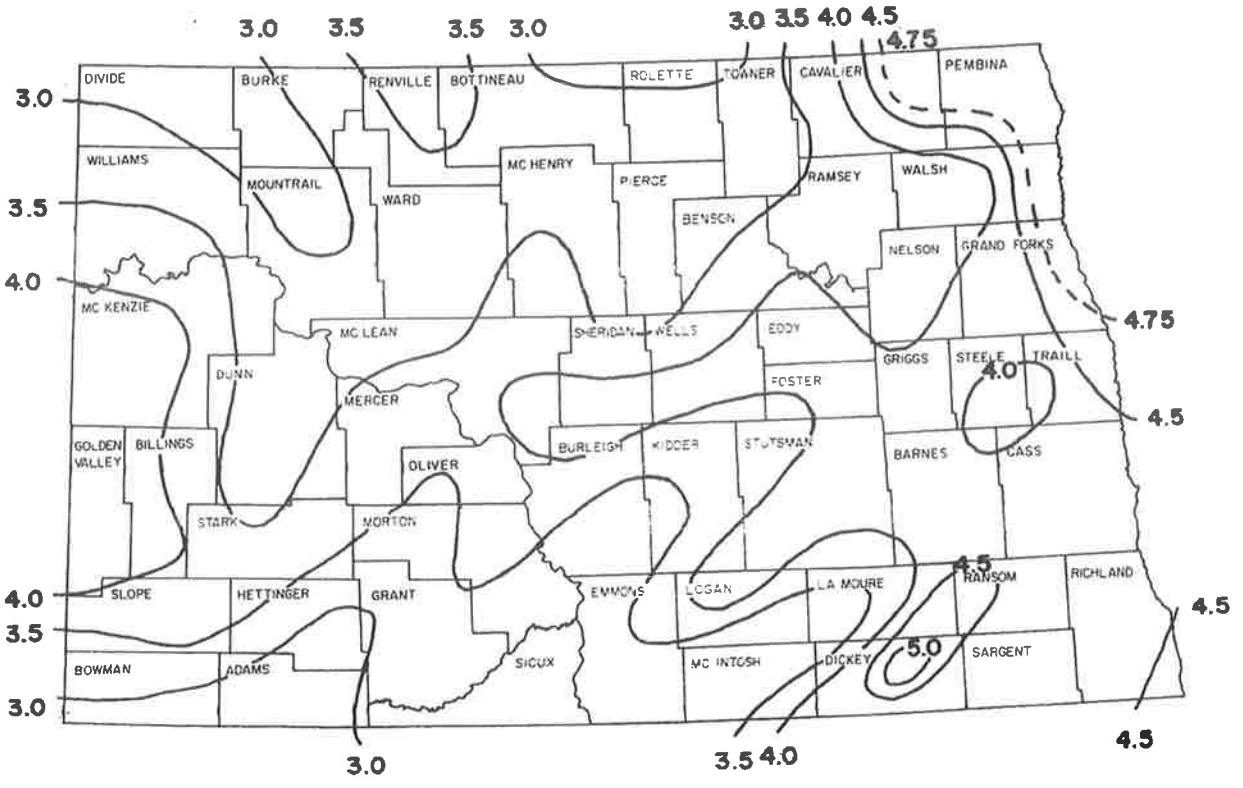


Figure 40. October through March Mean Precipitation in Inches.

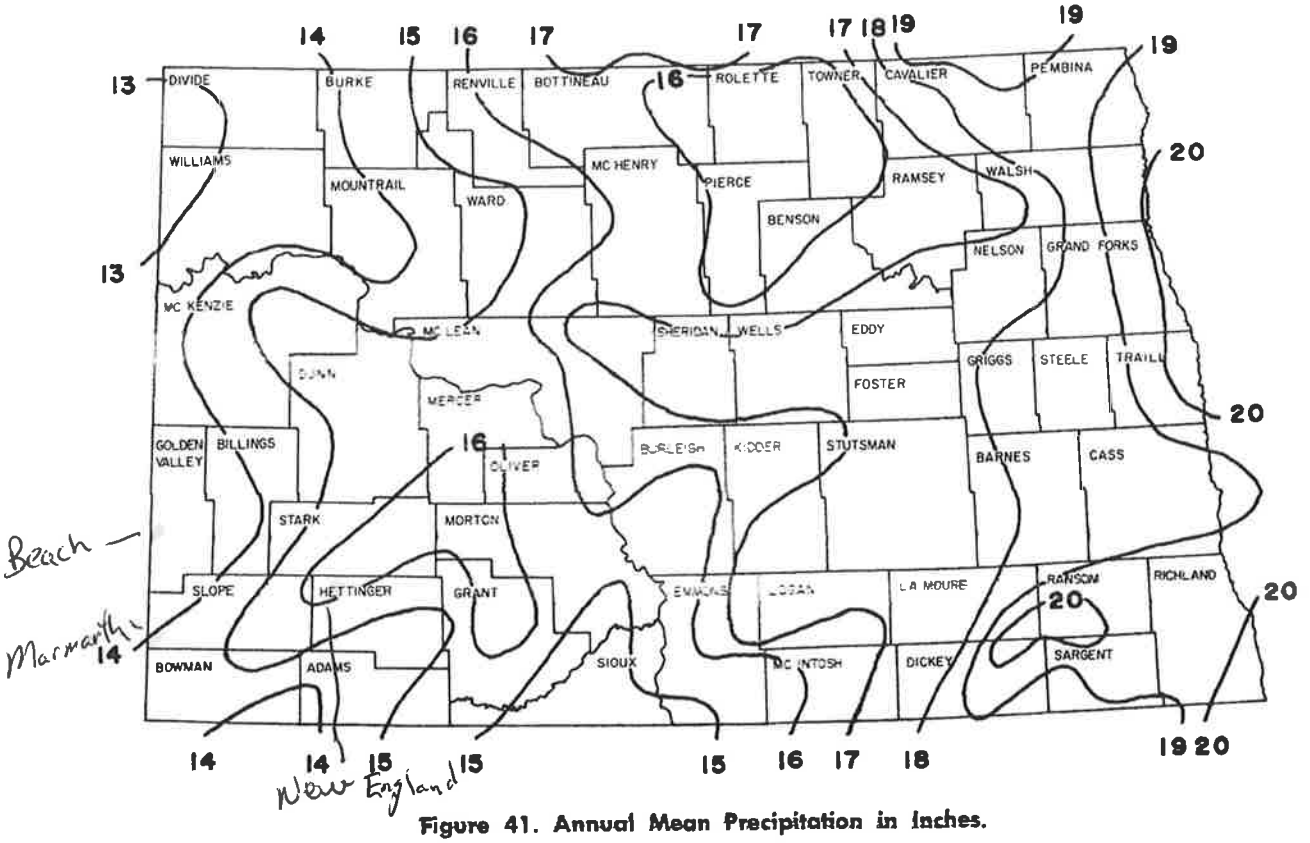


Figure 41. Annual Mean Precipitation in Inches.

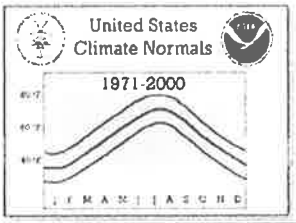
TOWN	1971-2000 30 yr avg.	1981-2010 30 yr avg.	Change	Losers	Gainers
Abercrombie	21.17	23.86	2.69		2.69
Adams	18.73	19.68	0.95		0.95
Alexander	14.35	14.25	-0.10	-0.10	
Almont	16.64	16.87	0.23		0.23
Ambrose	14.59	14.15	-0.44	-0.44	
Amidon	14.85	14.43	-0.42	-0.42	
Ashley	18.3	19.57	1.27		1.27
Beach	15.26	15.23	-0.03	-0.03	
Belcourt	17.95	18.92	0.97		0.97
Berthold	17.77	17.38	-0.39	-0.39	
Beulah	16.59	17.02	0.43		0.43
Bismarck AP	16.84	17.85	1.01		1.01
Bismarck 7NE	17.88	18.51	0.63		0.63
Bottineau	18.45	17.97	-0.48	-0.48	
Bowbells	16.77	17.06	0.29		0.29
Bowman	15.5	15.59	0.09		0.09
Butte	16.65	17.65	1.00		1.00
Cando	15.43	19.3	3.87		3.87
Carrington	18.73	20.15	1.42		1.42
Carrington 4N	19.89	20.3	0.41		0.41
Carson	16.7	16.92	0.22		0.22
Casselton	21.53	23.37	1.84		1.84
Cavalier	18.25	19.17	0.92		0.92
Center	17.48	18.51	1.03		1.03
Chaffee	20.55	21.72	1.17		1.17
Colgate	18.37	19.76	1.39		1.39
Cooperstown	20.5	21.58	1.08		1.08
Courtena	18.78	19.32	0.54		0.54
Crosby	14.94	14.92	-0.02	-0.02	
Devils Lake	18.93	20.42	1.49		1.49
Dickinson Exp Stn	16.61	16.71	0.10		0.10
Dickinson Ranch	15.5	16.84	1.34		1.34
Drake	16.36	17.34	0.98		0.98
Dunn Center	16.36	15.59	-0.77	-0.77	
Edgeley	19.32	20.38	1.06		1.06
Edmore	18.16	19.47	1.31		1.31
Elgin	17.19	18.17	0.98		0.98
Ellendale	21.43	22.64	1.21		1.21
Enderlin	19.6	22.24	2.64		2.64
Fairfield	14.79	14.97	0.18		0.18
Fargo AP	21.19	22.58	1.39		1.39
Fessenden	17.07	16.92	-0.15	-0.15	
Forbes	19.51	20.65	1.14		1.14
Forman	20.58	22.12	1.54		1.54
Fort Yates	14.14	14.83	0.69		0.69

TOWN	1971-2000 30 yr avg.	1981-2010 30 yr avg.	Change	Losers	Gainers
Fullerton	21.12	21.5	0.38		0.38
Gackle	18.81	20.31	1.50		1.50
Garrison	16.02	17.5	1.48		1.48
Grafton	18.32	20.01	1.69		1.69
Grand Forks AP	19.6	20.81	1.21		1.21
Grand Forks Univ	19.35	21.62	2.27		2.27
Granville	17.7	17.77	0.07		0.07
Grassy Butte	15.27	16.22	0.95		0.95
Hague	17.11	18.17	1.06		1.06
Hansboro	18.5	18.61	0.11		0.11
Harvey	15.11	17.77	2.66		2.66
Heart Butte Dam	15.75	16.27	0.52		0.52
Hebron	16.73	17.29	0.56		0.56
Hettinger	15.51	15.65	0.14		0.14
Hillsboro	20.7	21.62	0.92		0.92
Jamestown AP	18.49	18.77	0.28		0.28
Jamestown Hos	18.53	19.6	1.07		1.07
Keen	16	16.71	0.71		0.71
Kenmare	17.15	18.3	1.15		1.15
Killdeer	16.92	16.29	-0.63	-0.63	
Lake Metigoshe	20.08	20.11	0.03		0.03
La Moure	21.75	22.77	1.02		1.02
Langdon	18.11	19.42	1.31		1.31
Leeds	17.93	19.43	1.50		1.50
Linton	16.12	16.9	0.78		0.78
Lisbon	20.18	21.113	0.93		0.93
Litchville	20.9	21.73	0.83		0.83
Maddock	17.58	18.45	0.87		0.87
Mandan	17.04	17.95	0.91		0.91
Marmarth	14.58	15.48	0.90		0.90
Max	17.3	18.08	0.78		0.78
Mayville	20.38	23.92	3.54		3.54
Mc Clusky	17.68	17.56	-0.12	-0.12	
Mc Henry	20.09	21.19	1.10		1.10
Mc Leod	20.54	22.43	1.89		1.89
Mc ville	19.16	21.74	2.58		2.58
Medina	17.85	18.52	0.67		0.67
Medora	14.91	16.04	1.13		1.13
Minot AP	18.44	17.19	-1.25	-1.25	
Minot Exp Stn	18.65	18.59	-0.06	-0.06	
Moffit	16.53	16.9	0.37		0.37
Mohall	17.46	17.17	-0.29	-0.29	
Montpeleir	20.64	20.48	-0.16	-0.16	
Mott	16.55	16.56	0.01		0.01
Napoleon	19.02	19.74	0.72		0.72
New England	16.24	15.78	-0.46	-0.46	
New Salem	18.28	17.41	-0.87	-0.87	

TOWN	1971-2000 30 yr avg.	1981-2010 30 yr avg.	Change	Losers	Gainers
Oakes	19.55	22.35	2.80		2.80
Park River	19.89	20.84	0.95		0.95
Pembina	18.58	20.65	2.07		2.07
Petersburg	20.06	20.22	0.16		0.16
Pettibone	17.45	18.51	1.06		1.06
Powers Lake	16.1	15.32	-0.78	-0.78	
Pretty Rock	16.92	16.24	-0.68	-0.68	
Reeder	16.88	16.45	-0.43	-0.43	
Reeder 13 N	16.01	15.52	-0.49	-0.49	
Richardton	17.78	16.55	-1.23	-1.23	
Rolla	18.58	18.65	0.07		0.07
Rugby	18.27	19.64	1.37		1.37
Sharon	21.23	21.19	-0.04	-0.04	
Sherwood	13.13	14.07	0.94		0.94
Sheilds	16.92	16.9	-0.02	-0.02	
Stanley	19.73	18.69	-1.04	-1.04	
Steele	18.77	19.38	0.61		0.61
Streeter	17.09	18.4	1.31		1.31
Sykeston	18.9	19.8	0.90		0.90
Tagus	17.01	16.34	-0.67	-0.67	
Tioga	14.7	14.93	0.23		0.23
Towner	16.68	17.19	0.51		0.51
Trotters	14.71	14.81	0.10		0.10
Turtle Lake	17.62	17.55	-0.07	-0.07	
Tuttle	16.83	17.35	0.52		0.52
Underwood	17.77	16.74	-1.03	-1.03	
Upham	17.72	17.91	0.19		0.19
Valley City	18.89	20.62	1.73		1.73
Velva	18.1	18.81	0.71		0.71
Verona	19.17	20.4	1.23		1.23
Wahpeton	21.87	22.31	0.44		0.44
Walhalla	19.74	20.92	1.18		1.18
Washburn	17.8	17.18	-0.62	-0.62	
Watford City	14.41	14.67	0.26		0.26
Watford City 14 S	15.49	15.75	0.26		0.26
Westhope	17.02	17.43	0.41		0.41
Wildrose	14.65	15.17	0.52		0.52
Williston AP	14.16	14.37	0.21		0.21
Williston Exp St	14.99	14.31	-0.68	-0.68	
Willow City	17.17	17.83	0.66		0.66
Wilton	18.28	19.1	0.82		0.82
Wishek	18.45	20.89	2.44		2.44
Woodworth	17.93	18.99	1.06		1.06
Avg across state			0.68	-0.48	1.00
Number of locations			136	31	105

TOWN	1961-1990 30 yr avg.	1971-2000 30 yr avg.	1981-2010 30 yr avg.	Change 1st 30-last 30	Losers	Gainers
Lisbon	**19.33**	20.18	**21.113**	1.78		1.78
Litchville	**20.04**	20.9	**21.73**	1.69		1.69
Maddock	**17.12**	17.58	**18.45**	1.33		1.33
Mandan	**15.74**	17.04	**17.95**	2.21		2.21
Marmarth	**14.67**	14.58	**15.48**	0.81		0.81
Max	**16.8**	17.3	**18.08**	1.28		1.28
Mayville	**19.7**	20.38	**23.92**	4.22		4.22
Mc Clusky	**17.13**	17.68	**17.56**	0.43		0.43
Mc Henry	**18.6**	20.09	**21.19**	2.59		2.59
Mc Leod	**19.2**	20.54	**22.43**	3.23		3.23
Mc ville	**18.47**	19.16	**21.74**	3.27		3.27
Medina	**16.6**	17.85	**18.52**	1.92		1.92
Medora	**15.27**	14.91	**16.04**	0.77		0.77
Minot AP	**18.57**	18.44	**17.19**	-1.38	-1.38	
Minot Exp Stn	**17.98**	18.65	**18.59**	0.61		0.61
Moffit	**15.76**	16.53	**16.9**	1.14		1.14
Mohall	**17.16**	17.46	**17.17**	0.01		0.01
Montpeleir	**19.5**	20.64	**20.48**	0.98		0.98
Mott	**16.42**	16.55	**16.56**	0.14		0.14
Napoleon	**17.74**	19.02	**19.74**	2.00		2.00
New England	**17.14**	16.24	**15.78**	-1.36	-1.36	
New Salem	**17.37**	18.28	**17.41**	0.04		0.04
Oakes	**19.3**	19.55	**22.35**	3.05		3.05
Park River	**18.77**	19.89	**20.84**	2.07		2.07
Pembina	**17.78**	18.58	**20.65**	2.87		2.87
Petersburg	**19.32**	20.06	**20.22**	0.90		0.90
Pettibone	**16.87**	17.45	**18.51**	1.64		1.64
Avg across state				1.42	-1.37	1.64
Number of locations				27	2	25

New England			Marmarth			Beach		
1938	17.73	10 yr avg			10 yr avg			10 yr avg
1939	15.42					1948	0.45	
1940	19.14					1949	8.8	
1941	23.08		1950	5.09		1950	18.56	
1942	22.88		1951	17.12		1951	14.1	
1943	19.25		1952	8.85		1952	8.89	
1944	20.13		1953	M		1953	17.19	
1945	19.62		1954	M		1954	17.43	
1946	19.02		1955	M		1955	12.05	
1947	19.61	19.59	1956	M		1956	9.97	
1948	19.16		1957	16.19	M	1957	17.95	12.54
1949	10.63		1958	12.46		1958	11.16	
1950	17.94		1959	12.51		1959	11.2	
1951	15.06		1960	11		1960	8.45	
1952	8.81		1961	12.4		1961	10.68	
1953	19.28		1962	18.43		1962	15.78	
1954	14.29		1963	15.88		1963	14.81	
1955	18.66		1964	14.65		1964	17.68	
1956	16.06		1965	13.97		1965	20.19	
1957	20.63	16.05	1966	15.34		1966	13.91	
1958	12.85		1967	14.36	14.10	1967	14.58	13.84
1959	12.31		1968	7.37		1968	15.39	
1960	13.35		1969	11.94		1969	17.88	
1961	13.5		1970	16.44		1970	11.2	
1962	22.28		1971	18.22		1971	18.41	
1963	21.24		1972	15.81		1972	16.07	
1964	17.77		1973	M		1973	14.96	
1965	17.48		1974	11.02		1974	12.99	
1966	19.32		1975	17.69		1975	18.09	
1967	16.38	16.65	1976	11.62		1976	M	8 yr avg.
1968	14.69		1977	12.19	13.59	1977	M	15.51
1969	18.89		1978	M		1978	4.33	
1970	21.87							
1971	20.51							
1972	21.57							
1973	15.98							
1974	11.42							
1975	19.42							
1976	12.51							
1977	22.27	17.91						
1978	21							



CLIMATOGRAPHY OF THE UNITED STATES NO. 81

Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days

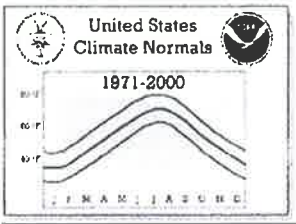
1971-2000

NORTH DAKOTA

1981-2010

PRECIPITATION NORMALS (Total in Inches)

No.	Station Name	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	
001	ABERCROMBIE	.65	.55	1.25	1.56	2.45	3.03	3.92	2.82	1.93	1.78	.79	.44	21.17	23.86
002	ADAMS 7 SSW	.50	.46	.75	1.07	2.34	3.28	3.54	2.60	1.67	1.37	.70	.45	18.73	19.68
003	ALEXANDER 4 NNW	.44	.27	.57	1.08	2.04	2.86	2.33	1.45	1.46	.92	.57	.36	14.35	14.25
004	ALEXANDER 18 SW	.36	.29	.57	1.03	2.02	2.56	1.87	1.20	1.54	.79	.53	.47	13.23	
005	ALMONT	.37	.33	.63	1.49	2.22	3.41	2.48	2.28	1.24	1.17	.62	.40	16.64	16.87
006	AMBROSE 3 N	.24	.27	.51	1.01	2.11	2.74	2.68	1.87	1.67	.84	.39	.26	14.59	14.15
007	AMIDON	.37	.35	.57	1.15	2.29	3.06	2.24	1.42	1.37	1.17	.53	.33	14.85	14.43
008	ASHLEY	.41	.39	.94	1.49	2.73	3.48	2.52	2.30	1.57	1.57	.61	.29	18.30	19.57
009	BEACH	.43	.47	.62	1.56	2.41	2.63	1.93	1.41	1.53	1.20	.70	.37	15.26	15.23
010	BELCOURT KEYA RADIO	.39	.37	.60	1.11	2.33	3.55	2.84	2.61	1.95	1.15	.61	.44	17.95	18.92
011	BERTHOLD	.59	.55	.84	1.54	2.21	3.08	2.79	1.80	1.77	1.32	.77	.51	17.77	17.38
012	BEULAH 1 W	.31	.42	.73	1.71	2.21	3.30	2.35	1.53	1.60	1.35	.70	.38	16.59	17.02
013	BISMARCK MUNICIPAL AP	.45	.51	.85	1.46	2.22	2.59	2.58	2.15	1.61	1.28	.70	.44	16.84	17.85
014	BISMARCK 7 NE	.59	.53	.91	1.59	2.21	2.78	2.79	2.12	1.57	1.38	.85	.56	17.88	18.51
015	BOTTINEAU	.49	.46	.79	1.22	2.16	3.29	3.04	2.62	1.94	1.27	.66	.51	18.45	17.97
016	BOWBELLS	.46	.44	.69	1.25	2.21	2.94	2.96	1.94	2.02	1.11	.46	.29	16.77	17.06
017	BOWMAN	.49	.48	.73	1.32	2.53	3.07	2.03	1.20	1.31	1.33	.59	.42	15.50	15.59
018	BREIEN	.35	.38	.66	1.60	2.49	2.92	2.69	1.77	1.48	1.32	.52	.35	16.53	
019	BUTTE 5 SE	.46	.44	.72	1.42	2.37	2.89	2.65	1.67	1.56	1.39	.70	.38	16.65	17.65
020	CANDO 2 E	.27	.29	.44	.92	2.24	3.04	2.81	2.11	1.22	1.24	.55	.30	15.43	19.30
021	CARRINGTON	.68	.56	.91	1.36	2.11	3.32	3.15	2.19	1.60	1.45	.89	.51	18.73	20.15
022	CARRINGTON 4 N	.52	.40	.75	1.44	2.49	3.79	3.11	2.48	1.84	1.82	.84	.41	19.89	20.30
023	CARSON	.31	.42	.90	1.70	2.36	3.06	2.46	1.74	1.40	1.39	.60	.36	16.70	16.92
024	CASSELTON AGRONOMY FRM	.75	.51	1.23	1.43	2.67	3.60	3.24	2.68	2.13	1.89	1.03	.37	21.53	23.37
025	CAVALIER 7 NW	.39	.41	.66	1.10	2.19	3.17	3.31	2.63	1.78	1.54	.68	.39	18.25	19.17
026	CENTER 4 SE	.40	.45	.71	1.63	2.30	3.00	2.70	1.85	1.85	1.55	.62	.42	17.48	18.51
027	CHAFFEE 5 NE	.57	.45	.96	1.45	2.74	3.31	3.29	2.44	2.13	1.96	.86	.39	20.55	21.70
028	COLGATE	.47	.39	.81	1.17	2.49	3.08	2.65	2.42	2.06	1.69	.76	.38	18.37	19.74
029	COOPERSTOWN	.67	.53	1.01	1.31	2.56	3.30	3.33	2.78	1.96	1.65	.90	.50	20.50	21.58
030	COURTENAY 1 NW	.61	.44	.76	1.28	2.34	3.35	2.98	2.49	1.87	1.54	.71	.41	18.78	19.32
031	CROSBY	.48	.33	.59	1.02	2.01	2.69	2.75	1.54	1.62	.93	.53	.45	14.94	14.92
032	DEVILS LAKE KDLR	.58	.51	.80	.90	2.14	3.83	3.29	2.21	1.80	1.47	.83	.57	18.93	20.42
033	DICKINSON AP	.37	.43	.69	1.76	2.28	3.31	2.11	1.51	1.62	1.34	.59	.34	16.35	
034	DICKINSON EXP STN	.35	.37	.67	1.63	2.24	3.57	2.20	1.65	1.62	1.31	.63	.37	16.61	16.71
035	DICKINSON RANCH HQ	.37	.35	.61	1.50	2.03	3.18	2.30	1.79	1.40	1.06	.58	.33	15.50	16.84
036	DRAKE 9 NE	.36	.39	.60	1.25	2.26	3.04	2.75	1.97	1.48	1.24	.68	.34	16.36	17.34
037	DRAYTON	.50	.34	.76	1.16	2.25	3.33	2.80	2.47	2.23	1.59	.69	.52	18.64	
038	DUNN CENTER 2 SW	.40	.41	.68	1.52	2.30	3.26	2.13	1.72	1.57	1.30	.68	.39	16.36	15.97
039	EDGELEY 3 WNW	.61	.41	1.16	1.63	2.90	3.26	2.18	2.87	1.80	1.45	.67	.38	19.32	20.38
040	EDMORE 1 NW	.50	.40	.65	1.02	2.15	3.21	3.32	2.59	1.71	1.39	.74	.48	18.16	19.47
041	EDMUNDS ARROWWOOD REF	.57	.58	.82	1.29	2.20	3.32	3.13	2.51	1.98	1.39	.63	.42	18.84	
042	ELGIN	.45	.32	.78	1.79	2.67	3.41	2.14	1.89	1.23	1.37	.72	.42	17.19	18.17
043	ELLENDALE	.49	.50	1.11	1.95	2.99	3.61	2.94	2.53	2.20	1.95	.83	.33	21.43	22.64
044	ENDERLIN 2 W	.58	.38	.85	1.42	2.62	3.40	3.42	2.20	2.02	1.77	.56	.38	19.60	22.24
045	EPPING	.51	.37	.75	1.26	1.95	2.71	2.41	1.82	1.65	.84	.52	.48	15.27	
046	FAIRFIELD	.31	.33	.56	1.41	2.04	2.95	2.10	1.62	1.50	1.16	.50	.31	14.79	14.97
047	FARGO HECTOR AP	.76	.59	1.17	1.37	2.61	3.51	2.88	2.52	2.18	1.97	1.06	.57	21.19	22.58
048	FESSENDEN	.53	.43	.67	1.12	2.13	3.47	2.77	1.93	1.57	1.32	.67	.46	17.07	16.92
049	FORBES 10 NW	.59	.53	1.30	1.74	3.01	3.17	2.45	2.10	1.74	1.70	.76	.42	19.51	20.65
050	FORMAN 5 SSE	.65	.53	1.24	1.68	2.60	3.54	3.02	2.25	1.93	1.68	1.02	.44	20.58	22.12
051	FORTUNA 1 W	.34	.36	.76	.99	1.98	2.87	2.71	1.62	1.33	.85	.33	.39	14.53	
052	FORT YATES 4 SW	.24	.30	.66	1.34	2.16	2.64	2.06	1.62	1.28	1.26	.35	.23	14.14	14.83
053	FOXHOLM 7 N	.51	.44	.80	1.25	1.96	2.97	2.60	1.84	1.67	1.39	.68	.46	16.57	17.19
054	FULLERTON 1 ESE	.75	.66	1.44	1.91	2.84	3.16	2.88	2.22	2.02	1.80	1.03	.41	21.12	21.50
055	GACKLE	.44	.38	.94	1.49	2.61	3.37	3.06	2.03	1.89	1.48	.77	.35	18.81	20.31
056	GARRISON 1 NNW	.39	.36	.63	1.27	2.10	3.12	2.62	1.91	1.44	1.22	.57	.39	16.02	17.50
057	GLEN ULLIN	.45	.43	.77	1.44	2.13	3.27	2.48	1.80	1.33	1.23	.66	.33	16.32	
058	GRAFTON	.52	.50	.85	1.13	2.31	3.30	2.77	2.39	1.76	1.46	.90	.43	18.32	20.01
059	GRAND FORKS INTL AP	.68	.58	.89	1.23	2.21	3.03	3.06	2.72	1.96	1.70	.99	.55	19.60	20.81
060	GRAND FORKS UNIV NWS	.78	.62	.89	1.17	2.11	2.98	2.89	2.92	1.95	1.59	.86	.59	19.35	21.62
061	GRANVILLE	.37	.49	.83	1.39	2.37	3.47	2.83	1.91	1.67	1.32	.64	.41	17.70	17.77
062	GRASSY BUTTE 2 ENE	.32	.37	.67	1.34	2.38	2.99	1.97	1.49	1.47	1.22	.68	.37	15.27	16.22
063	GRENORA	.32	.28	.55	1.12	2.02	2.40	2.29	1.35	1.50	.82	.45	.46	13.56	
064	HAGUE	.33	.35	.82	1.55	2.48	3.22	2.41	2.07	1.39	1.61	.60	.28	17.11	18.17
065	HANKINSON	.81	.74	1.24	1.76	2.76	3.47	3.35	2.70	2.16	1.80	1.08	.44	22.31	
066	HANNAH	.34	.24	.38	.99	2.04	3.05	2.75	3.12	2.24	1.31	.57	.34	17.37	
067	HANSBORO 4 NNE	.64	.63	.85	1.12	2.39	3.19	2.87	2.59	1.62	1.22	.81	.57	18.50	18.61
068	HARVEY	.42	.28	.62	.78	1.97	2.80	2.29	2.29	1.45	1.48	.45	.28	15.11	17.77
069	HEART BUTTE DAM	.51	.32	.87	1.70	2.34	2.91	2.31	1.45	1.16	.99	.77	.42	15.75	16.27



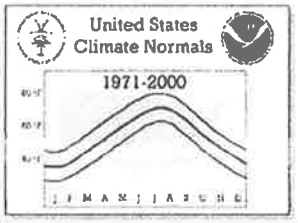
CLIMATOGRAPHY OF THE UNITED STATES NO. 81

Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days
1971-2000

NORTH DAKOTA

PRECIPITATION NORMALS (Total in Inches)

No.	Station Name	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	
070	HEBRON	.26	.31	.56	1.66	2.53	3.23	2.70	1.64	1.69	1.28	.58	.29	16.73	17.29
071	HETTINGER	.30	.32	.60	1.59	2.54	2.95	2.16	1.46	1.40	1.35	.53	.31	15.51	15.65
072	HILLSBORO 3 N	.50	.55	.93	1.56	2.35	3.46	3.23	2.78	2.05	1.92	.89	.48	20.70	21.62
073	HURDSFIELD 8 SW	.49	.45	.64	1.26	2.22	3.35	2.57	1.96	1.45	1.35	.69	.39	16.82	
074	JAMESTOWN MUNICIPAL AP	.62	.52	.89	1.36	2.21	3.05	3.22	2.33	1.74	1.40	.71	.44	18.49	18.77
075	JAMESTOWN ST HOSPITAL	.50	.35	.73	1.27	2.27	3.24	3.28	2.43	2.01	1.49	.63	.33	18.53	19.60
076	KEENE 3 S	.39	.37	.59	1.26	2.32	3.19	2.47	1.51	1.68	1.16	.66	.40	16.00	16.71
077	KENMARE 1 WSW	.83	.63	.90	1.26	2.07	2.66	2.67	1.80	1.92	1.19	.69	.53	17.15	18.30
078	KILLDEER 8 NW	.44	.50	.87	1.57	2.30	3.36	2.09	1.57	1.65	1.44	.66	.47	16.92	16.29
079	LAKE METIGOSHE ST PK	.68	.68	.80	1.09	2.70	3.15	3.26	2.64	2.24	1.34	.95	.55	20.08	20.11
080	LA MOURE	.78	.64	1.36	1.85	2.67	3.69	3.42	2.30	1.90	1.78	.91	.45	21.75	22.77
081	LANGDON EXP FARM	.42	.39	.61	1.00	2.36	3.33	3.18	2.73	1.66	1.38	.66	.39	18.11	19.42
082	LARIMORE	.53	.53	.97	1.25	2.24	3.57	3.45	2.91	2.05	1.55	.91	.45	20.41	
083	LEEDS	.55	.51	.83	1.28	2.08	2.98	3.17	2.07	1.61	1.53	.84	.48	17.93	19.43
084	LINTON	.34	.37	.77	1.36	2.32	2.95	2.57	1.80	1.30	1.44	.51	.39	16.12	16.90
085	LISBON	.63	.48	1.09	1.47	2.59	3.45	2.87	2.27	2.20	1.82	.86	.45	20.18	21.13
086	LITCHVILLE 2 NW	.65	.50	1.10	1.66	2.65	3.68	3.18	2.17	2.00	1.97	.90	.44	20.90	21.73
087	MADDOCK	.49	.45	.77	1.05	2.03	3.27	3.25	1.92	1.80	1.41	.71	.43	17.58	18.45
088	MANDAN EXPERIMENT STN	.38	.37	.58	1.52	2.41	2.91	2.90	2.02	1.56	1.41	.62	.36	17.04	17.95
089	MARMARTH	.37	.40	.68	1.38	2.23	2.90	2.00	1.32	1.24	1.13	.57	.36	14.58	15.48
090	MAX	.55	.43	.74	1.48	2.16	3.21	2.69	1.84	1.72	1.41	.63	.44	17.30	18.08
091	MAYVILLE	.72	.62	1.08	1.38	2.29	3.50	2.73	2.85	1.98	1.77	.86	.60	20.38	23.90
092	MC CLUSKY	.58	.49	.71	1.49	2.13	3.41	2.61	2.06	1.61	1.39	.71	.49	17.68	17.56
093	MC HENRY 3 W	.60	.48	.87	1.32	2.28	3.63	3.09	2.76	1.99	1.47	1.03	.57	20.09	21.19
094	MC LEOD 3 E	.65	.51	1.01	1.30	2.63	3.39	3.54	2.32	2.05	1.78	.94	.42	20.54	23.45
095	MC VILLE	.58	.36	.88	1.09	2.26	3.39	3.23	2.54	2.16	1.38	.83	.46	19.16	21.74
096	MEDINA	.46	.47	.87	1.32	2.26	3.32	3.02	2.00	1.87	1.29	.61	.36	17.85	18.52
097	MEDORA	.35	.36	.64	1.35	2.26	2.89	2.16	1.38	1.45	1.12	.58	.37	14.91	16.04
098	MINOT AP	.65	.53	1.05	1.55	2.31	3.15	2.70	1.95	1.74	1.32	.86	.63	18.44	17.19
099	MINOT EXPERIMENT STN	.77	.60	1.03	1.56	2.28	3.01	2.52	2.01	1.78	1.40	1.05	.64	18.65	13.59
100	MOFFIT 3 SE	.29	.33	.66	1.31	2.16	3.00	2.84	2.08	1.73	1.36	.50	.27	16.53	16.90
101	MOHALL	.52	.42	.73	1.24	2.17	2.98	2.86	2.17	1.89	1.46	.63	.39	17.46	17.17
102	MONTPELIER	.59	.54	1.07	1.73	2.59	3.50	3.05	2.40	2.18	1.67	.91	.41	20.64	20.48
103	MOTT	.41	.50	.80	1.83	2.59	3.17	2.13	1.69	1.26	1.24	.55	.38	16.55	16.56
104	NAPOLEON	.58	.51	.98	1.64	2.48	3.20	2.88	2.19	1.77	1.55	.80	.44	19.02	19.74
105	NEW ENGLAND	.38	.39	.69	1.62	2.46	3.38	1.93	1.73	1.44	1.37	.47	.38	16.24	15.78
106	NEW SALEM 5 NW	.47	.49	.81	1.88	2.42	3.17	2.76	2.11	1.53	1.38	.76	.50	18.28	17.41
107	OAKES 2 S	.60	.44	1.04	1.71	2.45	3.25	2.76	2.04	2.26	1.77	.82	.41	19.55	22.35
108	PARK RIVER	.66	.56	.92	1.25	2.41	3.42	3.19	2.61	1.80	1.64	.88	.55	19.89	20.84
109	PEMBINA	.44	.40	.72	.99	2.09	3.41	2.95	2.68	2.12	1.48	.85	.45	18.58	20.45
110	PETERSBURG 2 N	.66	.43	.94	1.17	2.27	3.62	3.25	2.71	2.06	1.54	.90	.51	20.06	20.22
111	PETTIBONE	.53	.38	.69	1.34	2.14	3.32	2.81	1.86	1.80	1.44	.71	.43	17.45	18.51
112	POWERS LAKE 1 N	.38	.37	.72	1.27	2.12	2.74	2.90	1.94	1.71	1.07	.55	.33	16.10	15.32
113	PRETTY ROCK	.33	.41	.86	1.89	2.64	3.02	2.34	1.76	1.40	1.34	.62	.31	16.92	16.24
114	REEDER	.36	.36	.68	1.61	2.88	3.29	2.23	1.59	1.49	1.52	.54	.33	16.88	16.45
115	REEDER 13 N	.39	.41	.82	1.61	2.51	2.94	1.97	1.58	1.51	1.41	.54	.32	16.01	15.53
116	RICHARDTON ABBEY	.45	.48	.86	1.75	2.49	3.39	2.27	1.88	1.60	1.41	.75	.45	17.78	16.55
117	RIVERDALE	.37	.29	.39	1.16	2.04	3.18	2.37	1.76	1.70	1.17	.38	.26	15.09	
118	ROLLA 3 NW	.51	.52	.76	1.13	2.30	3.41	2.87	2.55	1.95	1.25	.80	.53	18.58	18.65
119	RUGBY	.51	.45	.80	1.28	2.25	3.05	3.21	2.28	1.92	1.32	.70	.50	18.27	19.64
120	SAN HAVEN	.43	.58	.61	.93	1.90	2.69	2.68	2.59	1.80	1.26	.43	.40	16.30	
121	SHARON	.68	.54	1.12	1.33	2.65	3.55	3.45	2.67	2.05	1.67	.97	.55	21.23	21.19
122	SHERWOOD 3 N	.16	.19	.31	.80	1.77	2.65	2.57	1.82	1.44	.91	.28	.23	13.13	14.07
123	SHIELDS	.42	.42	.87	1.75	2.61	2.88	2.55	1.69	1.31	1.41	.63	.38	16.92	16.90
124	STANLEY 3 NNW	.57	.49	.87	1.59	2.58	3.88	2.94	2.13	2.15	1.23	.76	.54	19.73	18.69
125	STEELE 3 N	.48	.44	.98	1.51	2.53	3.24	2.95	2.01	1.90	1.55	.74	.44	18.77	19.38
126	STREETER 7 NW	.31	.34	.68	1.26	1.96	3.04	3.09	2.38	1.97	1.10	.69	.27	17.09	18.40
127	SYKESTON	.57	.51	.88	1.49	2.23	3.39	2.99	2.03	1.78	1.73	.83	.47	18.90	19.80
128	TAGUS	.66	.54	.96	1.33	1.97	3.14	2.35	1.68	1.85	1.22	.72	.59	17.01	16.34
129	TIOGA 1 E	.48	.36	.58	1.17	2.00	2.60	2.20	1.80	1.58	.94	.59	.40	14.70	14.93
130	TOWNER 2 NE	.55	.55	.72	1.21	1.93	2.67	2.69	2.06	1.83	1.30	.64	.53	16.68	17.19
131	TROTTERS 3 SSE	.35	.39	.58	1.23	2.09	2.90	1.89	1.50	1.61	1.16	.61	.40	14.71	14.81
132	TURTLE LAKE	.63	.49	.85	1.44	2.19	3.32	2.67	1.96	1.50	1.32	.73	.52	17.62	17.55
133	TUTTLE	.44	.39	.62	1.38	2.29	3.14	2.81	1.77	1.76	1.28	.59	.36	16.83	17.35
134	UNDERWOOD	.54	.46	.78	1.64	2.25	3.52	2.48	1.77	1.59	1.44	.77	.53	17.77	16.74
135	UPHAM 3 N	.57	.47	.76	1.33	2.07	3.32	2.71	2.00	1.80	1.28	.85	.56	17.72	17.91
136	VALLEY CITY 3 NNW	.54	.46	.80	1.22	2.60	3.27	2.75	2.43	2.10	1.53	.80	.39	18.89	20.62
137	VELVA 3 NE	.68	.50	.78	1.34	2.30	3.22	2.80	1.83	1.62	1.61	.92	.50	18.10	18.81
138	VERONA	.39	.35	.97	1.75	2.50	3.37	3.11	2.01	2.04	1.70	.72	.26	19.17	20.40



CLIMATOGRAPHY OF THE UNITED STATES NO. 81

Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days
1971-2000

NORTH DAKOTA

No.	Station Name	PRECIPITATION NORMALS (Total in Inches) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	
139	WAHPETON 3 N	.62	.39	1.02	1.76	2.96	3.33	3.53	2.69	2.43	2.03	.74	.37	21.87	22.31
140	WALHALLA 1 SW	.70	.61	.83	1.16	2.15	3.17	3.22	2.58	2.00	1.72	1.00	.60	19.74	20.92
141	WASHBURN	.45	.48	.75	1.64	2.26	3.28	2.75	1.99	1.67	1.44	.68	.41	17.80	17.18
142	WATAUGA S DAKOTA 8 N	.29	.38	.77	1.57	2.55	2.70	2.31	1.58	1.23	1.20	.54	.34	~~15.46~~	14.67
143	WATFORD CITY	.45	.39	.56	1.04	2.13	3.05	2.11	1.55	1.30	.77	.65	.41	14.41	
144	WATFORD CITY 14 S	.36	.37	.62	1.30	2.15	2.89	2.17	1.70	1.66	1.35	.55	.37	15.49	15.75
145	WESTHOPE	.47	.46	.71	1.16	2.06	3.03	2.90	2.04	1.87	1.21	.62	.49	17.02	17.43
146	WILDROSE 3 NW	.42	.35	.60	1.00	2.04	2.56	2.83	1.56	1.48	.83	.53	.45	14.65	15.17
147	WILLISTON SLOULIN AP	.54	.39	.74	1.05	1.88	2.36	2.28	1.48	1.35	.87	.65	.57	14.16	14.37
148	WILLISTON EXP FARM	.48	.34	.62	1.13	2.09	2.72	2.45	1.63	1.56	.94	.58	.45	14.99	14.31
149	WILLOW CITY	.52	.42	.78	1.18	1.99	3.10	2.85	2.34	1.72	1.20	.63	.44	17.17	17.83
150	WILTON	.47	.36	.58	1.44	2.32	3.65	3.06	2.15	1.72	1.43	.67	.43	18.28	19.10
151	WISHEK	.42	.46	.87	1.64	2.41	3.71	2.73	2.25	1.62	1.45	.55	.34	18.45	20.89
152	WOODWORTH	.34	.31	.56	1.20	2.32	3.39	3.34	2.15	1.94	1.45	.62	.31	17.93	18.99

Appendix J

February 5, 2018

ND State Water Commission
Dept 770
900 East Boulevard Ave
Bismarck ND 58505

To Whom It May Concern:

The Mountrail County Weather Modification Authority Members would like to express our support for the weather modification projects in the state of North Dakota. We feel that a majority of the people we represent are also in support of the projects. The positive economic impact it creates is well worth the investment. The reduction of hail and increased rainfall benefits not only the farming community but everyone in the state.

Sincerely,

Signature	Position
Tim Johnson	Weather Mod Board Member
	Weath Mod Board Member
	Weather Mod Board Chairman

HAMERS AGENCY LLC
PO BOX 910
STANLEY ND 58784
701-628-1414

WAYNE OLSON	ARLO BORUD	TRUDY RULAND	DAN URAN	GARRY A. JACOBSON
District # 1	District #2	District #3	District #4	District #5
(701) 497-3898	(701) 628-3287	(701) 627-3588	(701) 627-3511	(701) 453-3315

Mountrail County Commissioners

Mountrail County Courthouse
101 North Main Street - Box 69
Stanley, North Dakota 58784-0069
Tel. (701) 628-2145 Fax (701) 628-2276

February 6, 2018

To whom it may concern:

The Board of Mountrail County Commissioners would like to express their interest in keeping the Weather Modification Program running for years to come.

Sincerely,

Arlo Borud

Arlo Borud
Chairman of Mountrail County

Appendix K

North Dakota State Water Commission
900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
(701) 328-2750 • TTY 1-800-366-6888 or 711 • FAX (701) 328-3696 • http://swc.nd.gov

M E M O R A N D U M

TO: Governor Doug Burgum
Members of the State Water Commission
FROM: Garland Erbele P.E., Chief Engineer – Secretary
SUBJECT: Devils Lake Hydrologic and Outlet Updates
DATE: January 17, 2018

Hydrologic Update

The January 17th Devils Lake water surface elevation is 1449.6 feet which is approximately 0.5 ft below the lake level one year ago. In 2017, precipitation was several inches below average throughout the basin, and the region entered winter with unsaturated soils that will have some ability to absorb spring snowmelt. The long-range outlook for Jan-Feb-March is currently indicating chances for above normal precipitation, and the first lake level forecast has not yet been prepared.

Outlet Update

In 2017, the Devils Lake Outlets began discharging on May 4th (East) and May 8th (West). Both outlets operated steadily throughout the summer and were shut down for the year on October 30th. The combined outlet discharge was **131,872 acre-feet** which is approximately 9.5 inches at the current lake elevation.

Dry conditions in early December allowed outlet and construction crew staff to complete a stabilization project along the West Outlet canal that will reduce erosion immediately upstream of the outfall.

Several additional maintenance projects are planned for the upcoming spring:

1. Additional holes will be added to the Round Lake standpipe center column to provide greater foam control and prevent the need for use of the sprinker system.
2. An electrical preventive maintenance service is planned for the West Outlet electrical equipment.
3. A minor repair and evaluation of the East Outlet outfall basin will be completed.

GE:JK:TD:ph/416-10

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MEMORANDUM

TO: Governor Doug Burgum
Members of the State Water Commission
FROM: Garland Erbele, P.E., Chief Engineer-Secretary
SUBJECT: Missouri River Update
DATE: January 12, 2018

System/Reservoir Status

Total System

System volume on January 12 in the six mainstem reservoirs was 56.3 million acre-feet (MAF), 0.2 MAF above the base of flood control. This is 3.4 MAF above the average system volume for the end of December and 0.2 MAF more than at the end of December 2016.

Lake Sakakawea

On January 12, Lake Sakakawea was at an elevation of 1840.1 feet msl, 2.6 feet above the base of flood control. This is 2.3 feet higher than a year ago and 6.2 feet above its average end of December elevation. The minimum end of December elevation was 1807.8 feet msl in 2006, and the maximum end of December elevation was 1845.3 feet msl in 1972.

Lake Oahe

On January 12, the elevation of Lake Oahe was 1606.0 feet msl, 1.5 feet below the base of flood control. This is 2.1 feet lower than a year ago and 6.9 feet higher than the average end of December elevation. The minimum end of December elevation was 1572.8 feet msl in 2006, and the maximum end of December elevation was 1609.8 feet msl in 1997.

Fort Peck

On January 12, the elevation of Fort Peck was 2235.8 feet msl, which is 1.8 feet above the base of flood control. This is 1.8 feet higher than a year ago and 7.0 feet higher than the average end of December elevation. The minimum end of December elevation was 2198.9 feet msl in 2004, and the maximum end of December elevation was 2245.0 feet msl in 1975.

Runoff and Reservoir Forecasts

On January 8, mountain snowpack in the "Above Fort Peck" reach was 109 percent of average. In the "Fort Peck to Garrison" reach it was 125 percent of average. Typically, 44 percent of the peak mountain snowpack has accumulated by January 1, and it normally peaks in mid-April.

According to the January reservoir forecast, releases from Garrison Dam are predicted to be 24,500 cfs in January and 25,000 cfs in February. The January runoff forecast predicts runoff above Sioux City for this year to be 26.6 MAF or 105 percent of average.

Ice-Affected Flow on Missouri River

Accumulation of ice on the Missouri River resulted in stage increases at the Bismarck gage beginning the week of December 25. River stage at the Bismarck gage increased to above 10' on December 30 and remained near 10' for much of January with a peak of 10.9' occurring on January 10. The river stage remained within the range that is expected during the freeze-up period and is not forecasted to reach the Bismarck gage action stage of 12.5'.

Missouri River Recovery Implementation Committee (MRRIC)

Section 5018 of the 2007 Water Resources Development Act (WRDA) authorized the Missouri River Recovery Implementation Committee (MRRIC). The Committee is to make recommendations and provide guidance on activities of the Missouri River Recovery Program (MRRP). MRRIC has nearly 70 members representing local, state, tribal, and federal interests throughout the Missouri River Basin. The representatives for the State of ND on MRRIC are John Paczkowski (primary) and Jesse Kist (alternate).

The Corps is currently in the process of preparing the Missouri River Recovery Management Plan and Environmental Impact Statement (MRRMP & EIS). This process involves the development of a range of alternatives for the purposes of avoiding jeopardy of species on the Missouri River that are protected under the Endangered Species Act, specifically the threatened piping plover and endangered least tern and pallid sturgeon.

The updated tentative schedule for compliance with the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) is as follows:

- March 2018: USFWS to release Biological Opinion (BiOp)
- Summer 2018: Issue Final EIS & Record of Decision

Water Supply Rule

The comment period for the Corps' proposed Water Supply Rule ended on November 17, 2017. A final decision has not been made regarding the Water Supply Rule, and the timeline for making such a decision has not been made clear.

The proposed rule pertains to the use of water from Corps' reservoirs for domestic, municipal, and industrial water supply. It attempts to define how the Corps would require users to enter into storage contracts and be charged for the use of water for those purposes. The state submitted comments that primarily center around the issue that the proposed rule is fundamentally flawed because of the Corps' misunderstanding of state versus federal jurisdictions with respect to water appropriation and western water law and its interpretation of the 1944 Flood Control Act. The proposed rule does not recognize states' rights to allocate water and interferes with states' sovereign rights.

GE:JGK:pdh/1392

North Dakota State Water Commission

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MEMORANDUM

TO: Governor Doug Burgum
Members of the State Water Commission
FROM: Garland Erbele, P.E., Chief Engineer/Secretary
SUBJECT: NDSWC– Mouse River Update
DATE: January 17, 2018

Mouse River Enhanced Flood Protection Project

The Souris River Joint Board (SRJB) sponsored Mouse River Enhanced Flood Protection Project (MREFPP) is a basin wide project looking to reduce flood risk in the Mouse River Basin within North Dakota. A Record of Decision on the United States Army Corps of Engineers (Corps) Section 408 permit was signed on December 19, 2017. The signing of this permit allows the MREFPP to modify existing federal projects within the City of Minot and lays the framework for approval of other major federal permits. Bids have been received for the first three phases in the City of Minot, but bids have not been awarded since all federal permits haven't been received. The project is currently waiting on the Corps Section 404 permit for all phases and the North Dakota State Water Commission's construction permit for phases MI-2 and MI-3. The deadline for awarding bids was January 15th, but the SRJB has requested an extension. The extension was granted with a deadline of February 9th. If all state and federal permits have not been received by February 9th the SRJB will have to renegotiate with the contractors or rebid each of the construction phases.

Integrated Feasibility Study

The Integrated Feasibility Study with the Corps is being conducted to determine if the federal government has interest in the MREFPP. The Corps has completed a draft of the Integrated Feasibility Report and the public comment period has closed. The Corps is currently reviewing and addressing comments related to the public comment period in order to prepare their final report. The Integrated Feasibility Report looked into expanding upon phases MI-1, MI-2, and MI-3 with the Feasibility Study's Tentatively Selected Plan. The Tentatively Selected Plan, also known as the Maple Diversion, ties into the current MREFPP. The draft report has an overall benefit cost ratio of 1.46 for the Tentatively Selected Plan, showing potential federal interest in the project.

Plan of Study

The International Joint Commission's Plan of Study will review and update the operating agreements for Rafferty, Alameda, Boundary, and Darling Dams. An appointed Study Board, which manages the review and update process, is planning on conducting their first public meeting in Minot, North Dakota at the Grand Hotel on the evening of Tuesday, February 20th. This public meeting would allow the public to view the Study Board's work plan and ask questions related to the Plan of Study.

The Study Board is also currently working on developing a modeling framework to complete the Plan of Study. The modeling framework will include a series of advanced hydrologic and hydraulic models that have been or need to be developed as part of the study.

GE:CK:ph/1974/2122

North Dakota State Water Commission

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M E M O R A N D U M

TO: Governor Doug Burgum
Members of the State Water Commission
FROM: Garland Erbele, P.E., Chief Engineer-Secretary
SUBJECT: NAWS – Project Update
DATE: January 12, 2018

Manitoba & Missouri Lawsuit

Summary judgement was granted to North Dakota on August 10, 2017. Both plaintiffs filed appeals in October and initial filings were due November 27, 2017. The court issued a briefing schedule January 3, 2018 with appellant's briefs due February 12, 2018, appellee's briefs due March 14, 2018, and appellant's reply briefs due March 28, 2018. We anticipate oral arguments in late summer or early fall of 2018.

Biota Water Treatment Plant Design

A pre-design meeting for the Biota WTP has held May 23, 2017 at Reclamation's office in Bismarck with the intent of establishing the guidelines for the design to ensure compliance with the Final SEIS and ROD. Several meetings have been held and we anticipate a process selection report in mid to late January. The estimated cost of this design is roughly $5.5 million. As this is a federal facility, it is 100% eligible for federal reimbursement for design, construction, and operations and maintenance.

GE:TJF:pdh/237-04

North Dakota State Water Commission
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M E M O R A N D U M

TO: Governor Doug Burgum
Members of the State Water Commission
FROM: Garland Erbele, P.E., Chief Engineer - Secretary
SUBJECT: SWPP – Project Update
DATE: January 11, 2018

Oliver, Mercer, North Dunn (OMND) Regional Service Area
Rural Distribution Contracts 7-9E, 7-9G Bid Schedule 1 and 2:
Final administrative items remain before final payments can be made on Contract 7-9E and Contracts 7-9G Bid Schedules 1 and 2.

Contract 5-17 Dunn Center Elevated Reservoir:
This contract includes furnishing and installing a 1,000,000-gallon elevated composite reservoir. The substantial completion date on this contract was August 15, 2014. The tank was turned over for service on August 13, 2015. We had agreed to 21-day extension to the contract because of abnormal weather and delay in completing the contract documents. The Liquidated Damages for 347-day delay is $256,500. The contractor's attorney sent a letter to Bartlett & West indicating that the contractor is willing to pay the actual damages incurred by the Owner. The damage caused by the delay in completion of this tank is the delay in serving the City of Killdeer. We estimated the actual damages to be $212,058.32. A mediation was held with the contractor, Caldwell Tanks Inc., on January 10, 2018. A settlement was reached with the contractor agreeing to pay $170,000 in damages to the State Water Commission. A change order reflecting the reduction in contract price was signed by the contractor and the State Water Commission at the end of the mediation.

Other Contracts
Contract 8-1A New Hradec Reservoir:
This contract involves furnishing and installing a 296,000-gallon fusion powder coated bolted steel reservoir. Olander Contracting Company is the contractor. The contract documents were executed on May 16, 2013, and the Notice to Proceed was issued on June 3, 2013. The substantial completion date on this contract was September 15, 2013. The tank was put into service on February 20, 2014. The contractor disputes the liquidated damages withheld. The contractor has not provided any justification for the delays. The contractor has filed a lawsuit against us and their tank sub-contractor. Our legal counsel has filed an answer to their lawsuit. We have not heard anything regarding the lawsuit for many months.

Contract 3-2D Six (6) MGD Water Treatment Plant (WTP) at Dickinson:

The General Contract is around 92 percent complete. Startups of the major process equipment are ongoing. The clarifier system startup is complete. Startup of the membrane system is ongoing. Four change orders totaling $225,726.24 (1percent of the Contract amount) have been executed by all parties. The current Substantial Completion date based on the executed change orders is January 2, 2018 and Final Completion Date is February 15, 2018. We expect the

contract completion date to be further extended to account for abnormal weather delays and delays caused by work change directives. We have proposed adjusting the Substantial Completion Date to January 16, 2018 and Final Completion Date to February 28, 2018. Because of the coordination issues between three prime contractors and in order to get all the contractors to focus on getting the job completed, addition of a Partial Substantial Completion Date defined as when the facility is capable of producing potable finished water is also currently being proposed to the Contractors.

The Electrical contract is around 80 percent complete. The contractor is working on completing connections to the equipment on site and working on energizing them. The startup of the emergency generator is complete.

The Mechanical contract is around 76 percent complete. The waste and vent piping is mostly complete. The contractor is currently working on installing the unit heaters and hydronic piping to the HVAC equipment. HVAC and fire sprinkler installation is mostly complete. One change order for $46,272.62 has been signed by all parties. The permanent heat to the site is ready to be turned on now.

Contract 3-2E Residual Handling Building at Dickinson WTP:

The preconstruction conference for this contract was held on October 5, 2017 with all three contractors, Rice Lake Construction Group, Central Mechanical, Inc. and Edling Electric. The General Contractor, Rice Lake Construction Group, mobilized to site on October 16, 2017 and has completed the base slab pours and a couple of wall pours in the basement. Both the electrical and Mechanical contractors coordinated the placement of conduits and wall sleeves with the concrete pours completed by the General Contractor.

During the overnight hours on December 18, 2017, the construction site got flooded because of a malfunctioning raw water control valve in the Water Treatment Plant site. This caused a week delay for this contract. The contractor has filed claims with the Builder's Risk insurance policy.

Contract 4-1F/4-2C Generator Upgrades:

The contract is substantially complete. Administrative items remain before the contract can be closed out.

Contract 5-1A and 5-2A 2nd Richardton Reservoir and 2nd Dickinson Reservoir:

The State Water Commission (SWC), at its October 12, 2016 meeting, awarded Contract 5-2A, 2nd Dickinson Reservoir, to John T. Jones Construction Company. Preconstruction conference for this contract was held on March 30, 2017. The construction of the reservoir walls is complete. The leak test of the reservoir walls is complete. The dome installation has begun. The contract completion date on this contract is November 1, 2017. Backfilling operation around the reservoir has ceased because of unfavorable weather conditions. One change order for $19,475 has been executed by all parties.

The SWC at its December 9, 2016 meeting awarded Contract 5-1A, 2nd Richardton Reservoir, to Engineering America, Inc. A preconstruction conference for this was held on June 7, 2017. The tank panel installation is mostly complete. The contract has a milestone completion date of November 15, 2017 for the work on the new reservoir. The contractor sent in a letter requesting

extension through January 5, 2018. BW/AECOM has responded to their request agreeing to 17 out of the 31 days requested which extended the completion date to December 11, 2017. The inlet piping to the reservoir has not passed the pressure test. Because of the unfavorable weather conditions for completing the remaining work, extension of the contract completion date is being considered with the contractor being asked to reimburse the State Water Commission for the additional field inspector costs.

Contract 2-1B Raw Water Line Capacity Upgrade from intake to OMND WTP:

The scope of work for Contract 2-1B generally consists of furnishing and installing 19,026 lineal feet of 30" diameter steel pipeline. This construction season, the contractor planned on completing all three jack and bore crossings on the contract. Currently the contractor has completed two out of the three crossings and is expected to return next spring to resume construction on this Contract.

Contract 1-2A Supplemental Raw Water Intake:

The contractor J.W.Fowler Company (JWF) launched the Microtunneling Boring Machine (MTBM) along the current alignment on August 2017. On October 5, 2017, JWF had installed approximately 1000 feet of intake pipe when employees observed some cracks on pipe no. 58 located approximately 500 feet from the caisson. After pushing a few additional pipes, the cracks worsened. On October 18, 2017, JWF informed that the best course of action to remediate the incident was to leave the installed pipe string in place and pursue other options to complete the intake pipe to the screen location.

JWF's initial plan was to install a rescue shaft 65 feet X 25 feet on top of the MTBM to retrieve the machine and relaunch the machine from the rescue shaft. This information was conveyed to the Corps to get permission for performing geotechnical exploration. Corps review indicated that the rescue shaft is located on an established culturally significant site. The allow ability of a rescue shaft at the location would depend on consultation and review by other agencies and tribes and will involve a significant amount of time. JWF is evaluating other options to complete the project.

Transfer of Service Agreements:

At the December 12, 2015 SWC meeting, the Commission approved the Transfer of Service agreement between the City of Killdeer, the SWA and the SWC. This was the first annexation agreement negotiated between a city served by Southwest Pipeline Project and the SWA. In early January 2016, the SWA mailed similar agreements to 33 communities within the SWPP service area except for the City of Dickinson using the same template as used for the City of Killdeer. The SWA has been negotiating different terms with the City of Dickinson, but now the City of Dickinson is agreeable to the same terms as the other communities. Some communities executed the agreement, while many communities expressed concerns about terms of the annexation agreement that was mailed to them. The SWA continues to meet with the communities to negotiate the terms. Twenty-nine communities out of the total 35 communities have executed the agreement.

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