WATER INFRASTRUCTURE BONDING REQUEST

Southern Water Source, System Storage and Transmission Improvements

S.F. No. 310

(Senate Authors: WEBER and Dahms)

Lincoln-Pipestone Rural Water System

Bonding Request Information

Holland Water Source (BIOTTTA):

Lincoln-Pipestone Rural Water (LPRW) System's Holland Water Treatment Plant (WTP) previously used reverse osmosis (RO) and conventional pressure filter treatment processes in parallel. Because of discharge permit requirements, the RO process was discontinued at the Holland WTP. The pressure filters continue to run and supply water to distribution, but the role of the Holland Water Source was significantly diminished in 2019 with the termination of the Holland WTP RO treatment process and the advent of the Lewis and Clark Water Source (L&C) connection. The L&C source is currently replacing the lost capacity at Holland; however, the L&C source was intended to support system growth and expansion. As system growth and expansion continues, it is now critical that the Holland water source be restored to its full capacity.

Currently there are eight wells in the Holland well field. Total wellfield capacity is 2,525 gpm and firm capacity is 2,025 gpm. Pumping rate from each well and maximum historic nitrate level is as follows:

Well #	Flow Rate (gpm)	Maximum Nitrate Level (ppm)
1	400	9.88
2	100	10.26
3	325	9.34
4	225	16.30
5	300	25.80
6	175	11.41
7	500	16.77
8	500	19.87

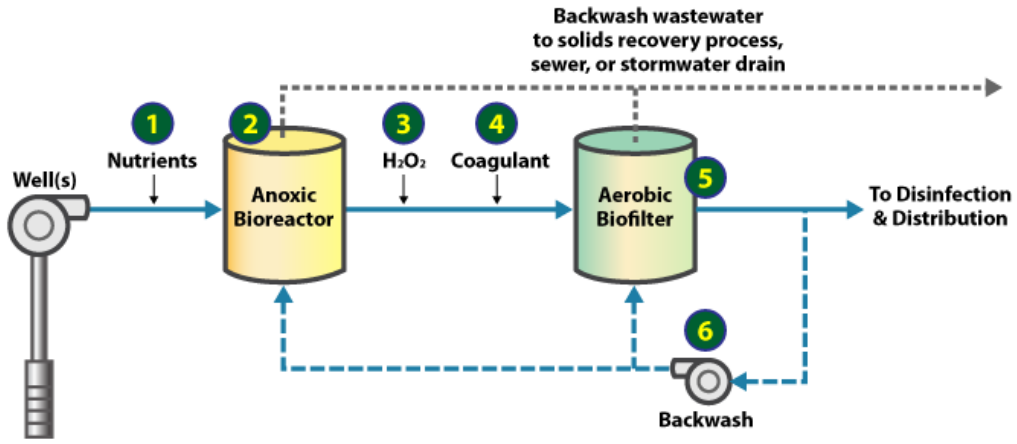
[Note: yellow highlighted wells are currently set as primary production wells. Grey highlighted wells are supplementary production wells (turned on only during high demand periods). All other wells not highlighted are not placed into production due to extremely high nitrate levels.]

Nitrate levels in each of the eight wells varied considerably in the period since the wells were constructed. Wells #4, #5, #7, and #8 exhibit the highest nitrate levels and usually received

treatment in the RO process. Use of these wells is discontinued until a new method for nitrate removal is devised. The remaining wells (#1, #2, #3 and #6) are lower in nitrates, but are higher in iron and manganese, and usually receive treatment for iron and manganese removal. Because nitrate levels in the low nitrate wells (#1, #2, #3 and #6) at times exceed the 10 ppm maximum contaminant limit, these wells were blended with the water from the RO treated wells in order to consistently produce a final product acceptably low in nitrates. Without RO treatment to remove nitrates, plant operators monitor nitrate levels in the plant discharge closely to ensure that the nitrate MCL of 10 ppm is not exceeded. When the RO system was in operation, the plant capacity was 1600-1800 gpm. Currently, without the RO system, the plant capacity is only 700-800 gpm.

LPRW completed a pilot project in 2013 that demonstrated the effectiveness of the BIOTTTA® method in removing nitrates from groundwater. They successfully purified water with 20 ppm of nitrates to <1.0 ppm. This was performed on their wells with the highest nitrate content at the Holland/North Holland water source.

BIOTTTA Treatment Process & Pilot Study



This process is done by utilizing the naturally occurring denitrifying bacteria present in the aquifer. A food source is added to the raw water to allow the bacteria to grow and flourish. The bacteria do their role by converting nitrates into nitrogen gas which then simply disperses into the atmosphere. This process has been used in Europe for a number of years and is becoming more prevalent in the US.

This $4,000,000 bonding allocation would cover half of the cost of the new treatment method and will allow LPRW to remedy serious vulnerabilities in our system while preventing the need to construct a new wastewater treatment facility that could cost in excess of $25,000,000.

Burr Water Treatment Plant (WTP) Improvements:

Lime-softening Contact Basin:
Consideration was given to proposing a second, redundant contact basin at the proposed Dawson-Boyd WTP in the event one basin fails or for use during routine maintenance. It was determined that a redundant contact basin is more advantageous at the Burr WTP than the Dawson-Boyd WTP. Due to their respective locations in the LPRW system, in periods of low system demand, Burr can serve the entire area which will be served by Dawson-Boyd source, but Dawson-Boyd source can serve only a portion of the area currently served by Burr. Therefore, construction of a redundant contact basin is proposed at the Burr WTP and not at the Dawson-Boyd WTP.

Burr WTP Storage:
The Burr WTP has a 500,000-gallon clearwell. The geometry of the clearwell and the location of the HSP intake provides 297,850 gallons of effective storage to the south and east service areas. An additional 127,650 gallons of storage is available to the east service area only, for a total effective storage volume of 425,500 gallons. At a maximum treatment capacity of 1,600 gpm, the effective clearwell storage allows about 4.5 hours of WTP downtime when operating at maximum capacity. A design best practice is to maintain at least 6 hours of clearwell storage. There are two main reasons for desiring at least 6 hours of clearwell storage. The first reason is to allow enough available downtime for routine maintenance, cleaning, and backwashing. A second reason is to minimize the required number of startup and shutdown cycles, providing flow equalization that allows the lime softening operation to produce water over a longer period. This provides a more consistent and higher water quality for LPRW's customers. Adding a new ground storage reservoir at the Burr site would grant the Burr WTP more flexibility for being out of service. The advantage is that a new GSR at the Burr WTP gives LPRW additional storage capacity which increases available downtime and provides more flow equalization.

This water source is crucial to the LPRW system, and the aging infrastructure here puts the source's reliability into question. If this treatment facility went down for maintenance, it would lead to shortages over one-third of our system, and negate the redundancy measures we have taken with the new Dawson-Boyd water source.

This $2,500,000 bonding allocation would allow us to maintain needed redundancy across parts of our system, while keeping rates affordable for our constituents.

System Storage and Transmission:

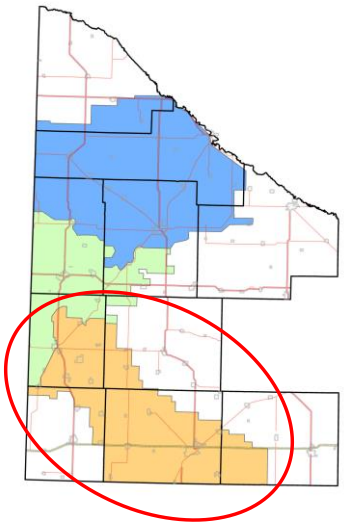
Ivanhoe Elevated Tank Delivery:
LPRW has difficulty delivering enough water to the Ivanhoe Elevated Tank to keep up with peak demand. During peak demand, the water level slowly drops despite LPRW's current efforts to fill it. LPRW has come dangerously close to emptying the tank which would result in depressurization of the system. Ideally, the system would be able to satisfy its peak day demands with 20 hours or less of pumping time in a day. This allows for some station downtime and a factor of safety in case a new record peak day is observed. The Ivanhoe Elevated Tank is served from the Burr water source via the Hendricks Elevated Tank.

Green Valley/Vallers Water Tower Storage and Booster:
The Cities of Dawson, Clarkfield, Cottonwood, Hanley Falls, Wood Lake, and Belview have expressed interest in receiving water from LPRW. However, it is likely that only 1-2 of those cities would connect to LPRW immediately. The Cities of Madison and Delhi have also discussed purchasing water from LPRW now or in the future. Rural users in Lac Qui Parle, Yellow Medicine, and Redwood Counties have also expressed interest in rural water service. New transmission pipelines and storage are needed to connect cities and areas of new water service to the Dawson-Boyd Water Source. A new booster station and water tower between the two sources becomes extremely useful in that it could be filled from both sources (existing Burr source and the new Dawson-Boyd source); providing advanced operational ability and redundancy.

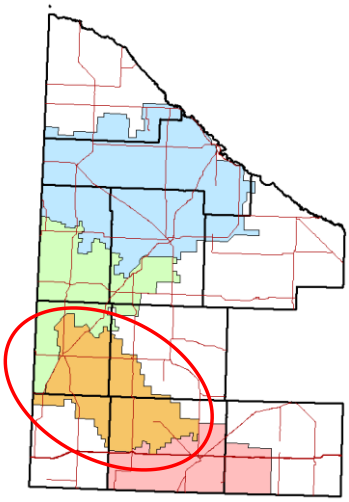
As LPRW continues to grow, demand in southwest Minnesota. Our limitations for transmission and delivery are becoming more evident. Recent drought conditions have been a very real challenge to the LPRW system and represent long-term problems. We need additional pumping and water storage to ensure redundancy and adequate transmission, especially in the northern portion of the system where LPRW currently imposes a moratorium on any new or expanding large users and municipalities. This $5,000,000 allocation will allow us to meet the appropriate pumping and storage availability for the demands of our system and fulfill the impending requests for water service in the northern portions of our system.

Recent Changes in LPRW System Supply Regions

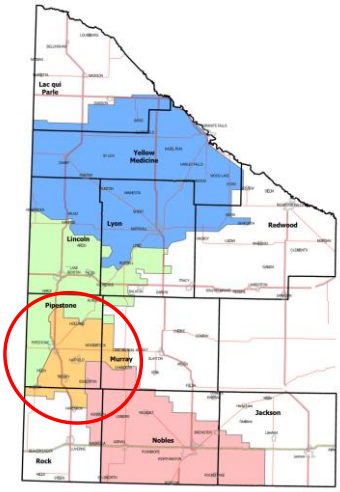
LPRW System – 2010



LPRW System – 2013



LPRW System – 2019



(Holland Water Source Supply Area highlighted in red circle)