CLAY COUNTY BOARD OF COMMISSIONERS
Tuesday, June 2, 2009
8:30 a.m.
County Board Room – 3rd Floor – Courthouse

M I N U T E S

The Clay County Board of Commissioners met in regular session on Tuesday, June 2, 2009, with all commissioners present: Campbell, Evert, Ingersoll, Waller and Weyland.

APPROVAL OF AGENDA

On motion by Campbell, seconded by Weyland, and unanimously carried, the agenda was approved as presented.

CITIZENS TO BE HEARD

Mr. Paul White, Project Resources Group, was present to follow-up on a letter he sent to the County Administrator last week clarifying wind energy tax issues. County Administrator Vijay Sethi indicated he would report on this matter further at the June 9th meeting.

EMPLOYEE RECOGNITION

Longevity

The following employees were recognized for their years of service to Clay County and its citizens:

Ms. Debbie Reed, Case Aide, Social Services, 15 years
Ms. Debra Benson, Corrections Officer, Law Enforcement Center, 20 years
Ms. Georgia Beaudry, Building Manager/FSCCC Manager, 25 years

Combat Cross Awards

Sheriff Bill Bergquist presented Combat Cross Awards to Deputies Jason Hicks, Mark Empting, and Ryan Carey for their assistance in the apprehension of Vincent Digidio in 2008.

Appreciation by Eventide Senior Living Communities

Mr. Randy Bach, Eventide Senior Living Communities, presented Clay County officials with a plaque expressing Eventide's appreciation to County employees for their assistance in organizing and planning for the relocation of Eventide's residents during the 2009 flood.

UPDATE RE: BARNESVILLE AMBULANCE SERVICE OPERATIONS

As a follow-up to a meeting with the County Board in December, 2009, Mr. Jon Yeske, Barnesville Ambulance Service, presented the Barnesville Ambulance Run Report for the period 1/1/09 to 5/31/09. The report identifies runs by city, times, provider impression of the incident, response disposition, reason, cause of injury, procedures administered, medication administered, average run mileage, run times, primary role of

unit, primary symptom, barriers to patient care, average patient age, transport hospital, and insurance type with service level.

Mr. Yeske advised that the Clay County townships in the service area have been requested for financial contributions. Wilkin County is solicited for funding, however the townships in Wilkin County in the service area are not. An Advisory Board for the Ambulance Service will be developed this fall, to include representation from the Counties and Townships.

In 2008, Clay County funded the Ambulance Service with $10,829 from Unanticipated Expenditures, in addition to the funds budgeted for 2008, $4,994. Barnesville Mayor Fred Dahnke was hopeful that Clay County would consider financial assistance again if the Ambulance Service experiences shortfalls this year.

Commissioner Evert commended the Ambulance Service for their efforts, and added that their financial projections for 2009 are better than expected.

Chair Waller acknowledged the importance of the service provided by the Ambulance Service, and noted that the County is experiencing financial difficulties with unallotments from the State. He added that it may be difficult to find funds to assist the Ambulance Service again this year.

The Board suggested that other fund raising options be explored by the Ambulance Service, such as assistance from the service clubs in Barnesville.

BUFFALO AQUIFER MANAGEMENT PLAN

Mr. Cliff McLain, Moorhead Public Service (MPS) Water Division Manager, was present to discuss the development of an aquifer management plan which would provide for a long-term water supply for the region. Mr. McLain provided and reviewed background information on this topic (see Attachment "A").

Mr. McLain reviewed a draft of the *Clay County/City of Moorhead Water Supply Planning for Drought of Five or More Years* (See attachment "B"), outlining various actions, the steps involved, who is responsible for the work, when it is expected to be completed, and how progress will be monitored.

Mr. McLain requested the following from the County Board:

1. Support development of an Aquifer Management Plan for the Buffalo Aquifer.
2. Support completion of the Clay County Atlas.
3. Review and comment on the action plan for the *Clay County/Moorhead Water Supply Planning for Drought of Five or More Years.*
4. Provide a letter of support for the DNR Legislative-Citizen Commission on Minnesota Resources (LCCMR) grant proposal entitled: *Next Generation in Water Management – Pilot Studies.*
5. Approve future funding and/or in-kind services for the Clay County Atlas and the Buffalo Aquifer Management Plan.

The Board members discussed the above mentioned items and were supportive of #1, 'Development of an Aquifer Management Plan for the Buffalo Aquifer'. With respect to #2, County Planning & Environmental Programs Director Tim Magnusson indicated that Clay County has requested the DNR to complete an Atlas, likely to take two years, at a cost of between $100,000-$150,000. Having just received the material, the Board felt they were not ready at this time to take action on item #3, 'Review and comment on the action plan

for the *Clay County/Moorhead Water Supply Planning for Drought of Five or More Years'.* The Board indicated their willingness to provide a letter of support (#4) for the DNR LCCMR grant proposal entitled: *Next Generation in Water Management – Pilot Studies*. Regarding request #5, consensus of the Board was that they are supportive, in concept, of future funding and/or in-kind services for the Clay County Atlas and the Buffalo Aquifer Management Plan.

On motion by Campbell, seconded by Evert and unanimously carried, the Board indicated their support of the development of an Aquifer Management Plan for the Buffalo Aquifer (item #1), and agreed to submit a letter of support for the DNR LCCMR grant proposal entitled *"Next Generation in Water Management – Pilot Studies"* subject to Moorhead Public Service submitting a letter of support.

APPROVE PAYMENT OF BILLS AND VOUCHERS

On motion by Campbell, seconded by Weyland, and unanimously carried, the bills and vouchers were approved for payment.

COMMITTEE REPORTS; COUNTY ADMINISTRATOR UPDATE

Commissioner Ingersoll attended the Lakes and Prairies Community Action Partnership meeting.

Commissioner Campbell attended the U.S. Senate's Energy and Water Development Appropriations Subcommittee hearing regarding flood control for the Fargo-Moorhead Metropolitan Area, and a meeting regarding the financial outlook for the Juvenile Detention Center.

Commissioner Evert attended meetings of the Planning Commission, AMC Planning group for the annual meeting, Local Water Planning Joint Powers, Family Healthcare Board, Breakfast on the Farm, Basin Commission Work Plan, and Personnel Issues Committee.

Commissioner Weyland attended the Juvenile Center financial planning meeting, Oakport Joint Powers, and the U.S. Senate's Energy and Water Development Appropriations Subcommittee hearing regarding flood control for the Fargo-Moorhead Metropolitan Area

Commissioner Waller testified at the U.S. Senate's Energy and Water Development Appropriations Subcommittee hearing regarding flood control for the Fargo-Moorhead Metropolitan Area, and attended the Personnel Issues Committee meeting.

The Board was informed that two open houses will be held June 3 regarding the new FEMA flood insurance maps for Clay County.

The AMC District IV meeting will be held Friday, June 5th in Fergus Falls.

The meeting involving the four local governmental boards concerning permanent flood protection will be held June 25, 11:45-1:15 p.m. at the Radisson in Fargo.

DISCUSSION RE: FLOOD BUYOUTS

Mr. Galen Vaa addressed the Board as one of several property owners in Crestwood Subdivision who sustained substantial damage during the flood. He expressed interest in a fast-track FEMA buy-out program for homes which sustained substantial damage, are in the 100 year flood plain, and are less than 45 years old. Planning & Environmental Programs Director Tim Magnusson was not aware of the program, and commented that costs are still being tallied for FEMA's flood mitigation assistance program and the hazard

mitigation grant program. Mr. Vaa indicated he would share the fast-track buy-out information with Mr. Magnusson.

Due to the fact that this topic was not on the agenda for discussion, Chair Waller requested that it be addressed at a later date, when it has been properly included on the agenda.

ADJOURN

The meeting adjourned at 10:45 a.m.

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Jerry C. Waller, Chair
Clay County Board of Commissioners

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Vijay K. Sethi, County Administrator

DEVELOPMENT OF AN AQUIFER MANAGEMENT PLAN AND LONG-TERM WATER SUPPLY

Background:
Moorhead Public Service has been actively involved in water supply planning for drought conditions on the Red River. Moorhead depends on the Red River as its primary water supply. The Buffalo and Moorhead Aquifers are our secondary supplies. A large capital investment was made by Moorhead to construct a new water treatment plant in 1995. The new water plant allows Moorhead to maximize the use of the Red River of the North, while reserving the Buffalo Aquifer for contamination events on the river and for water supply during a long-term drought. The new water plant has allowed the utility to reduce pumping from the Buffalo Aquifer by nearly 60 percent.

Moorhead has used the Buffalo Aquifer as a water supply since 1948. More than 20,000 million gallons of water has been pumped from the aquifer since than. The USGS and MGS have estimated that the Buffalo Aquifer has more than 200,000 million gallons in storage. The aquifer can yield 10-20 percent of that volume to pumping, if pumping is spread along the length of the aquifer.

The water levels in the Buffalo Aquifer have risen by 15 feet since the construction of the new water plant. It is the combination of the impacts of the current wet cycle and the reduction in the volume of water pumped that has returned the aquifer water levels to 1950's levels. Since 1995 we have reduced withdrawals from the aquifer a total of 5,000 million gallons. That water remains in storage in the aquifer. It is nearly 2/3 the volume of water Moorhead needs to supplement the Red River in a ten year 1930's type drought.

Figure 4 shows groundwater levels in the Buffalo Aquifer near our Hwy 10 wells. The figure illustrates the impact of pumping on water levels.

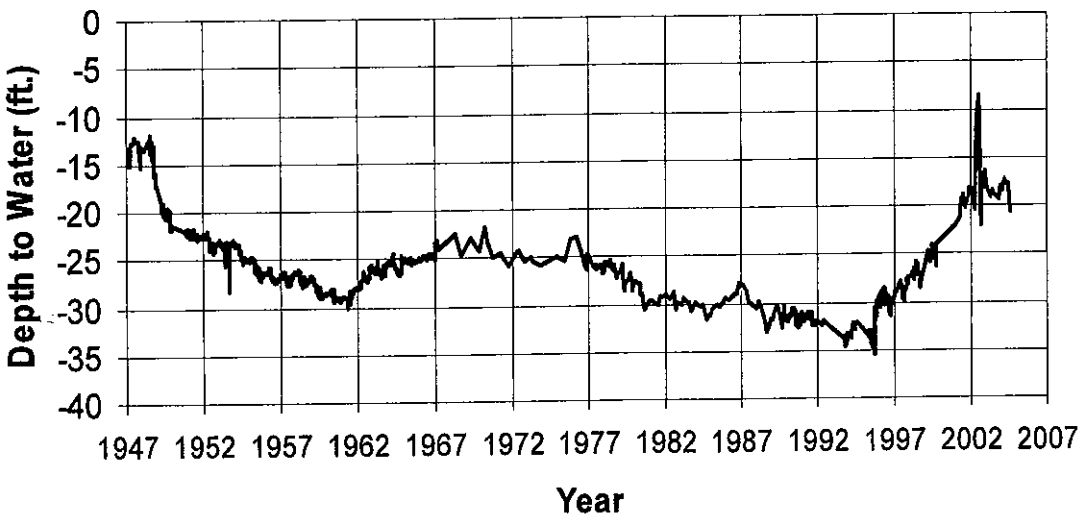


Figure 4

Drought Water Supply:
The Red River stopped flowing for extended periods during the 1930's drought. The Red River Valley will experience similar prolonged periods of drought in the future. Water utilities in the Red River Valley are studying alternatives for water supply for this type of event. Two potential water supply sources have been evaluated by Moorhead to meet water demands during an extended drought. The alternatives include the Red River Valley Water Supply Project and the expansion of facilities in the Buffalo Aquifer.

The lowest cost drought water supply alternative for Moorhead is additional development of the Buffalo Aquifer within Clay County. This alternative would bring groundwater from the aquifer south of I-94. A series of wells would be developed around and south of the Sabin area. This alternative will require the construction of a new pipeline and pumping station that would deliver the water to the treatment plant. Construction of this project can be accomplished in phases and delayed until the region is experiencing drought conditions.

Water supply studies using population projections for 2050 estimated the total water shortages for Moorhead during a ten year 1930's type drought would be 7,270 million gallons. Taking this volume of water from our existing well fields could excessively lower the water levels in the area of our wells. Additional well fields will need to be developed in the southern portion of the aquifer to spread out the impacts of withdrawing this volume of water.

Moorhead has three groundwater appropriation permits from the Minnesota Department of Natural Resources. Two of the permits are for the Buffalo Aquifer and the third is for the Moorhead Aquifer. The total annual permitted volume for the permits is 3,318 million gallons per year. The maximum yearly shortage during a 1930's type drought would have occurred under 1936 river flow conditions. The maximum estimated annual shortage under those conditions for Moorhead would be 1,830 million gallons. Our existing MNDNR appropriations are twice the volume of water needed to meet the maximum demand of a 1930's type drought.

The conjunctive use of surface water and groundwater has put Moorhead in the position of being able to meet future water demands. The Red River has the capacity to supply water for Moorhead, except during a severe drought. The Red River should be able to supply more than half the water needs during a 1930's type drought. Moorhead has groundwater appropriations permits that exceed our needs during a drought. The Buffalo Aquifer has sufficient water in storage to meet our water needs during a 1930's type drought. The aquifer should be capable of supplying the water needed of Moorhead and other users during a 1930's drought. Preserving the water in the Buffalo Aquifer gives the utility the capability to provide water to its customers during the next drought.

Aquifer Management Plan
The Minnesota Department of Natural Resources (DNR) is the state agency that oversees water appropriation permits. The normal process for expanding water supplies requires users to evaluate their water needs for the next ten years. They must then apply for changes in their appropriations with the DNR. This process does not work when we are requesting the appropriations for a long-term drought water supply, because we cannot predict when a drought will occur in the area.

We began discussions with the DNR in 2007 as to how we can secure a long-term drought water supply. DNR rule 810 allows for the development of an aquifer management plan to address the uses and potential conflicts which can occur in areas with limited water supplies. DNR staff suggested that we consider this option for securing the availability of water supply during a long-term drought.

In August of 2007 the Moorhead Public Service Commission formally requested the Minnesota Department of Natural Resources Water Division cooperate with and assist Moorhead, other local units of government, and land owners in developing a management plan for the Buffalo Aquifer within Clay County. The Commission requested assurances from the MN DNR that water would be allocated and permitted from the Buffalo Aquifer to Moorhead in the event of a long-term drought. The purpose of the plan would be to protect and reserve the groundwater resources of the Buffalo Aquifer for use as the regions drought water supply. A copy of the letter dated August 28, 2007 is included.

MPS requested that the DNR define the requirements that must be met when developing an aquifer management plan. MPS staff met with the DNR in January of 2009 to discuss our vision of an aquifer management plan and long-term drought water supply. In February 2009, the DNR staff with other state agency staff developed and provided a draft action plan and schedule to MPS that would meet their rules requirements and MPS objectives.

The action plan for the development of an aquifer management plan is scheduled to be completed over the next three years. The action plan includes data collection, monitoring, pump testing, development an aquifer model and the development of the Buffalo Aquifer Management Plan with public review and adoption

The aquifer management plan would establish priorities for water use within the area, allocate water reserves within the aquifer to the various user types, and establish triggers for implementation of the plan and its water use priorities. The Moorhead Water Emergency and Conservation Plan would apply to the resource during implementation of the drought water supply.

Implementation of the Action Plan
The action plan for Clay County/Moorhead Water Supply Planning for Drought of Five or More Years is included. The plan includes completion of the Clay County Atlas, study

of the Buffalo and Border Aquifers with the development of an Aquifer Management Plan, and exploration of additional aquifers in Clay County. The DNR has indicated that the study will include working with Wilkin County.

One of the first tasks in the action plan was to secure funding for the project. The MNDNR has completed and submitted a proposal to the Legislative-Citizen Commission on Minnesota Resources (LCCMR). The function of the LCCMR (formerly LCMR) is to make funding recommendations to the legislature for special environment and natural resources projects, primarily from the Environment and Natural Resources Trust Fund. These projects help maintain and enhance Minnesota's environment and natural resources.

The attached proposal submitted by the MNDNR requests funding for pilot studies for development of water management strategies across governmental jurisdictions and natural hydrologic units. The proposal title is "Next Generation in Water Management—Pilot Studies." There are four results that would be delivered by the proposed project if LCCMR funds the project. The project would complete portions of the action plan for the development of an aquifer management plan for Moorhead and Clay County. The LCCMR proposal includes studies for portions of Clay County, including the Buffalo Aquifer and the area referred to as Bonanza Valley in Stearns, Pope, and Kandiyohi Counties. The results would include compilation of existing and new data, water model update and enhancement, civic engagement and framework development, and framework and tools for water supply management. The proposal funding period is from July 2010 to June 2012. The funding request is for $945,500.

The proposal includes other sources of funding. Those sources include in-kind services from the MNDNR, MPS, and the United States Geological Survey (USGS). The total proposed pending funding from these sources is $301,600. It is expected that additional in-kind services may be provided by Clay County and the Buffalo Red River Watershed Board. Both units of government would be actively involved in the project and the aquifer management plan development. The 2009 flood activities have delayed the development of details from these two project partners.

MPS staff has proposed in-kind services for the proposed project of $65,600 for the two-year period starting in July 2010. The proposed in-kind services address many of the elements of the plan. The in-kind services that have been included in the proposal are listed below.

Provide necessary staff, available equipment, vehicles, and materials for the following in-kind services during the funding period:

	Estimated value
Continue to monitor groundwater static levels.	$20,000
Collect water quality samples using standard sampling protocol.	$11,000
Prepare and hold a minimum of two community meetings.	$ 4,600
Establish and maintain a web-based community communication site.	$ 6,000
Identify aquifer modeling scenarios.	$ 4,000

Aquifer management plan development, public review, and adoption.	$20,000
TOTAL	$65,600

Next Steps:
The next task from the plan that must be completed in the summer of 2009 is the building of support from other local units of government for the MNDNR-submitted LCCMR proposal and the development of the aquifer management plan. Letters of support from other water-related organizations and government agencies are needed to support the LCCMR proposal submitted by the MNDNR.

Work will begin this summer for the location of up to 2000 County Well Index wells located in Clay County. Moorhead Public Service will begin collecting the data.

The Moorhead Public Service Water Division Manager will make a presentation of the action plan at the June 2nd Clay County Commission Meeting.

Moorhead Public Service Requests from Clay County Commission:
The following actions are being requested from the Clay County Commission:

- Support development of an Aquifer Management Plan for the Buffalo Aquifer.
- Support completion of the Clay County Atlas.
- Review and comment on the action plan for the ***Clay County/Moorhead Water Supply Planning for Drought of Five or More Years.***
- Provide a letter of support for the DNR LCCMR grant proposal titled: ***Next Generation in Water Management—Pilot Studies.***
- Approve future funding and/or in-kind services for the Clay County Atlas and the Buffalo Aquifer Management Plan.

PROJECT SUMMARY AND RESULTS

This proposal seeks to develop and test a framework that will guide sustainable water management across governmental jurisdictions and natural hydrologic units.

MAIN PROPOSAL

PROJECT TITLE: NEXT GENERATION IN WATER SUPPLY MANAGEMENT – PILOT STUDIES

I. PROJECT STATEMENT

In order to conserve and yet sustainably utilize our water supply resources, a next generation in water supply management strategies is needed. This proposal seeks to develop and implement a framework that may be used to guide water management across governmental jurisdictions and natural hydrologic units. Traditional water management is based on political boundaries. In the future, water management will likely be based on surface watersheds. The natural management unit for groundwater is the aquifer, which may extend across political, ecological and surface watershed boundaries.

Two pilot study areas have been selected to develop new water use management strategies. Each of these areas encompasses multiple watersheds, aquifers, types of water uses and governmental jurisdictions, with differences being in the complexity of their groundwater systems and community perspectives on water supply management. One of the pilot areas encompasses portions of Clay County including but not limited to the Buffalo Aquifer along the South Fork Buffalo River. Although in recent history the area is known for an excess of water, water supply managers for the City of Moorhead and Clay County, which are partners in this project, want to balance water use from surface water and groundwater to assure an adequate drinking water supply during a prolonged drought similar to that of the 1930s. The other study area, the Bonanza Valley, is in Stearns, Pope and Kandiyohi Counties. This area is often considered to be water rich and, until recently, has supported agricultural irrigation without fully understanding the impact to human and ecologic systems. Several years of reduced precipitation and increased irrigation have resulted in water use conflicts.

This project will address potential future potential water supply problem scenarios related to both quantity and quality before they actually occur. This project will undertake scientific assessments which will lead to the identification of recharge areas in the study areas including potential quantity and quality vulnerabilities. Previous studies in these areas indicated a strong connection between groundwater and surface water. These technical studies were primarily focused on determining how much water is available to be removed without consideration of the impacts of the withdrawals on the entire hydrologic and ecologic system. This project will leverage updated and expanded aquifer data and maps from county geologic atlases, biologic surveys and regional basin studies, and ongoing water quality analyses to update and enhance earlier hydrologic models. General information will be shared through regional partners and community meetings. External technical guidance and options for resource management and framework development will be accomplished through technical expert workshops. Information will be made publically available and stored in a web-based format that conforms to state standards.

Locally supported water management plans for each pilot study area will be established. From these pilot studies, management response to diverse watershed scenarios will be developed. Implications of land and water uses and their relation to water quantity and quality will be considered. The outcome will be a framework and tools that are practical, replicable, scalable and useable for sustainable water management by and for the next generation.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Compilation of existing and new data **Budget:** $ 463,500

Results will be aggregated from past and ongoing data collection including geologic mapping, well inventories, hydrogeologic interpretations, surface water gaging, biologic surveys, wellhead protection studies, TMDL analyses, ground and surface water levels, and agricultural water quality analyses. Additional data will be gathered through new gaging stations and monitoring wells and selected resource (aquifer) testing.

Deliverable	Completion Date
1. Database created.	October 31, 2010
2. Installation of additional monitoring points, resource testing conducted.	April 30, 2011

Result 2: Water model update and enhancement **Budget:** $ 267,000

In order to build upon multiple previous studies and to utilize the considerable knowledge and abilities of this federal agency, the USGS will be engaged to update earlier hydrologic models. These models will assist in identifying potential recharge areas and impacts of groundwater withdrawal on surface waters and ecologic systems. This result will include an uncertainty analysis of the model which will identify areas of inadequate data. These findings will inform decisions about additional monitoring and testing.

Deliverable	Completion Date
1. Data compiled in Result 1 incorporated in models	April 30, 2011
2. Model scenarios developed	December 31, 2011
3. Models for both pilot studies updated	December 31, 2011
4. Addendum report for water supply management plan	June 30, 2012

Result 3: Civic engagement and framework development **Budget:** $ 92,000

The involvement of local governments and external partners is essential for the success of this project. Communities will be involved through the engagement of community groups, public meetings and web based information. Technical expert review and input will be engaged in framework development through a series of workshops.

Deliverable	Completion Date
1. A minimum of two community meetings held in each pilot area	June 30, 2012
2. Technical expert workshops conducted and findings incorporated into framework	March 31, 2012
3. Web-based community communication established and maintained	June 30 2012

Result 4: Framework and tools for water supply management **Budget:** $ 123,000

The result of these pilot studies will be a framework and tools for locally supported water supply management that is usable for large and small scale watershed management, considers ground and surface water, incorporates ecologic and economic considerations and conserves and yet sustainably utilizes our water resources. In addition to this framework, recommendations will be made for improved cooperative water management strategies.

Deliverable	Completion Date
1. Identification of recharge and discharge for each area	June 30, 2012
2. Pilot study areas water supply management plan	June 30, 2012
3. Framework for creation of water supply management plans	June 30, 2012

III. PROJECT STRATEGY

A. Project Team/Partners

Department of Natural Resources–project lead and data gathering; City of Moorhead and Clay County-local government leaders; Department of Health, Department of Agriculture and Pollution Control Agency-water quality assessments; Freshwater Society, the Univ. of Minn. Water Resource Center, Minnesota Rural Water Assoc.-framework development and civic engagement; US Geological Survey - technical support and modeling; Buffalo-Red River Watershed District – local involvement.

B. Timeline Requirements

This project will be conducted over a period of two years with anticipated report completion by June 30, 2012. Actual implementation of management plans for the pilot areas will continue after project completion. The duration and extent of this aspect will be one of the components of the pilot studies' management plans.

C. Long-Term Strategy

In addition to gathering new data and identifying recharge areas, this project will use the results to produce a framework and tools for system analysis and management of water on a watershed basis. The framework and tools will provide flexible guidance for future, long-term water supply management on a watershed basis. Future requests for LCCMR funding in these areas are not anticipated.

Project Budget

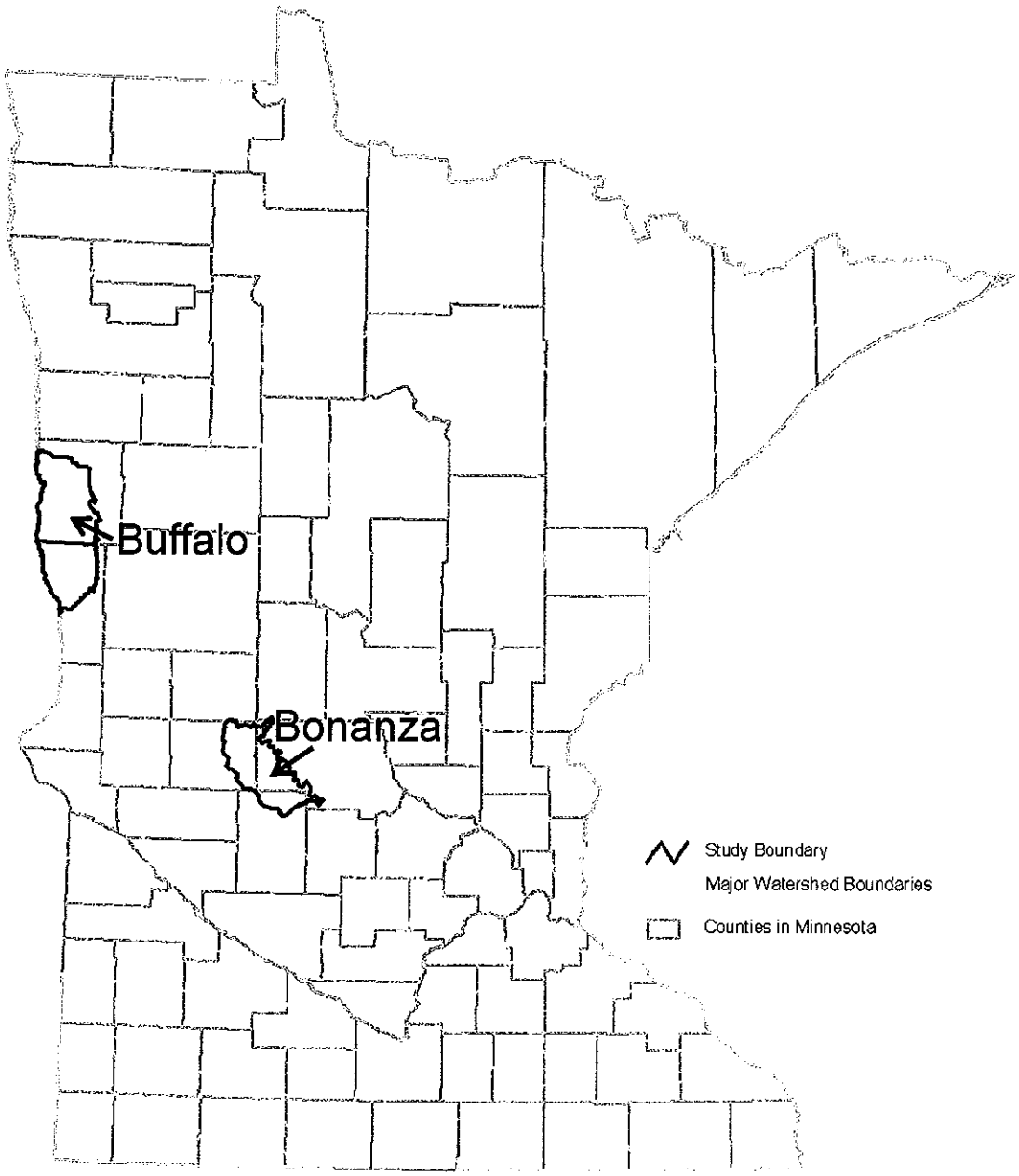
IV. TOTAL PROJECT REQUEST BUDGET (2 years)

BUDGET ITEM	AMOUNT
Personnel:	
NR Project Consultant - 1 FTE - July 2010 to June 2012 - salary +25% benefits	$ 205,000
Information Technology Specialist - 1/4 FTE - July 2010 to June 2012 - salary + 25% benefits	$ 36,000
Contracts:	
United States Geological Survey: modeling, groundwater/surface water model	$ 241,500
Well driller TBD: well installation and documentation	$ 80,000
Water Resource Center University of Minnesota and the Freshwater Society: workshops, community involvement, framework development	$ 40,000
Equipment/Tools/Supplies:	
Data loggers and power accessories, flow meters, pressure transducers, GIS computer and software, field laptop computer and software, steel tapes and chalk, drilling supplies, current meters, protective field gear, GPS receivers, telecommunications remote equipment and installation	$ 311,000
Travel: In-state - DNR travel for monitoring point installation, data collection, well installation, meeting attendance - Meals and lodging = $16,500 + mileage = $15,500	$ 32,000
TOTAL PROJECT BUDGET REQUEST TO LCCMR	$ 945,500

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
In-kind Services During Project Period:		
DNR Area Hydrologists - 1/4 FTE local contacts	$ 46,200	pending
Project Manager (H3) - 1/4 FTE	$ 49,500	pending
Hydrologist 1 - 1/4 FTE data management and field work	$ 36,800	pending
City of Moorhead-monitoring levels and sampling, meetings, web development, scenario identification, plan development, public review and adoption	$ 65,600	pending
United States Geological Survey - 30% contribution toward model development	$ 103,500	pending

Next Generation in Water Supply Management – Pilot Studies



LCCMR Proposal 2010

Title: Next Generation in Water Supply Management – Pilot Studies

Project Manager Qualifications:

Laurel D. Reeves, P.G.

- Professional Geologist License #30707
- DNR Waters Hydrogeologist
  - Manager - Water Appropriation Permit program
    - Surface and ground water allocations;,
    - Water management planning;
    - Water availability analyses.
  - Manager - Ground Water Level Monitoring – 1990 to 2006
    - Plan, coordinate and manage ground water level data statewide;
    - Plan, coordinate and manage an ongoing well and monitoring point maintenance, sealing and drilling program;
    - Initiate studies, analyses and reports on water resource management issues.
- DNR Waters and MPCA hydrologist – 1981 to 1990
  - Water appropriation and protected waters permits and inventory;
  - Solid waste and superfund permits and enforcement;
  - Environmental review, public drainage project review, local water planning.
- Soil Exploration Co./Twin City Testing – geologist – 1970 - 1980
- Publications:
  - Hydrogeologic Characterization of Six Sites in Southeastern Minnesota Using Borehole Flowmeters and Other Geophysical Logs, USGS Water-Resources Investigation Report 00-4142, 2000, co-authors;
  - Minnesota's Water Supply: Natural Conditions and Human Impacts; 2000; Laurel D. Reeves & John Linc Stine, editors.
- Professional leadership:
  - President 2005 - Minnesota Ground Water Association.
- Presentations:
  - Freeman Forum, Minnesota Environmental Initiative, Citizens League, Minnesota Geological Society, American Institute of Hydrologists, American Water Works Assoc., Minn. Water Well Assoc., Minn. Ground Water Assoc., municipal water engineers, watershed districts, Irrigator's Association, Minnesota Assoc. of Townships, Growing Greener Workshops, American Assoc. of Univ. Women, DNR Regional Managers, and DNR Parks managers - on water supply & management, water & ethanol, resource sustainability, ground and surface water, and the hydrologic cycle.

Organization Description:

Minnesota Department of Natural Resources, Waters Division

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Attachment "B"

Clay County ~ City of Moorhead Water Supply Planning for Drought of Five or More Years				
Required Action	**Steps Involved**	**Who**	**By When**	**How Monitored**
All Aquifers in southwestern Clay County				
County Atlas Part A	Standard process	MGS	TBD	MGS process
Wilkin County unpublished data mapped (abuts Clay County)	GIS mapping	DNR	May 1, 2009	GIS map available
County Atlas Part B	Standard process, potential add'l plate for aquifers of interest	DNR	After Part A	DNR process
Comprehensive Water Supply Plan for Southwest Clay County	Draft plan preparation Draft plan review Public comment Plan adoption	Clay County, Moorhead, DNR	Dec. 31, 2020	Plan Completed (all parts are completed)
Buffalo Aquifer				
Secure funding and in-kind services	Determine amounts needed Proposals preparation Deliver required services Funding obtained	Moorhead and County with assistance by DNR, MGS, USGS	LCCMR – May 1, 2009 On-going	Project or project increments funded
Build cooperating group	Meetings and public communications	City of Moorhead, County and DNR	On-going	Questions and concerns addressed, objections minimized
✓ Identify project manager	Cliff McLain	Moorhead, DNR	Feb. 20, 2009	Once selected ongoing reports to group
Identify permitted water use in Clay County	Database search, map preparation	DNR – Sean Hunt	March 31, 2009	Maps and database complete
Communications website	Identify options and obtain funding Obtain expertise and location Develop site and go live Keep site updated	City, County	May 31, 2009	Site is used for exchanging information and for community involvement
Summarize past studies	Review and report	USGS or DNR	May 31, 2009	Maps or brief report available
Ground water level monitoring both	Std. monitoring protocol	Moorhead, County, DNR	Ongoing	Data posted to DNR website
Determine need for further aquifer location verification	Review data and confer	MGS, DNR, USGS	June 30 2009	Locations identified
CWI well locations	Survey (x,y) wells in CWI & use LIDAR	Moorhead, County, MGS	Oct. 31, 2009	Database complete
Streamflow gaging and TMDL data collection	Identify and collect existing data Establish new locations Collaborate with other agencies and programs	DNR, Dept. of Agric., MPCA	Oct. 31, 2009	Stations established Data collected, available and analyzed
Identify water resources that conceptually may impact or be impacted by pumping	Review and analyze data collected to this point	DNR, USGS	Dec. 31, 2009	Locations

DRAFT ~ Feb. 24, 2009

Clay County ~ City of Moorhead Water Supply Planning for Drought of Five or More Years				
Required Action	**Steps Involved**	**Who**	**By When**	**How Monitored**
Buffalo Aquifer (cont.)				
CWI well locations	Verify known well locations, find unlocated wells	MGS County Atlas Part A, phase 1	Feb. 28, 2010	Database updated
Chemical sampling wells	Gather existing data Std. sampling protocol	Moorhead, County, Dept. of Agric.	June 30, 2010	Existing data available Wells to be sampled determined, basic water quality determined
Additional monitoring wells at locations TBD to define aquifer if needed	Standard exploration drilling	MGS or DNR	June 30, 2010	Wells in place
Resource test and analysis	Standard resource (aquifer) test	DNR	June 30, 2011	Report prepared
Modeling of scenarios	Incorporate data in common database Identify scenarios Run model	Moorhead, DNR	Dec. 31. 2011	Scenarios developed, modified, model run
Collate results of water use research, mapping, resource testing, etc. into draft water use and supply plan Prepare draft Buffalo Aquifer Plan	Report preparation	DNR, Moorhead and County	Dec. 31, 2011	Draft Buffalo Aquifer Management plan completed
Public review and adoption of Buffalo Aquifer Management Plan	Adoption plan prepared Public meetings Adopted by DNR, Moorhead and County	DNR, Moorhead and County	June 30, 2012	Plan for Buffalo Aquifer adopted
Border Aquifer				
Locate wells in this aquifer	CWI search	Moorhead, DNR	June 30, 2009	List prepared
Well locations	Survey (x,y) wells	Moorhead, County	Dec. 31, 2009	Database complete
Chemical sampling wells	Std. sampling protocol	Moorhead, County	June 30, 2010	Wells in aquifer determined, basic water quality determined
Water level monitoring	Std. monitoring protocol	Moorhead, County, DNR	Ongoing	Data posted to DNR website
Review of Border Aquifer as water supply	Review and analyze data collected to this point	DNR, Moorhead, County	Dec. 31, 2010	Draft report of aquifer adequacy prepared
Other Aquifers - to east of Moorhead and others if found				
Test and explore additional aquifers	Following completion of Part A of County Atlas	TBD	June 30, 2019	County Atlas complete, new action plan for additional aquifers