Prioritization criteria and nominating form for GWIP project areas

The following list is used to rank nominated project areas under the Ground Water Investigation program. The criteria name is highlighted to show which column heading is used in the ranking matrix. Please address all points. Possible sources of information are suggested, but other sources are likely available for most criteria. Each criterion is assigned a ranking value by the Ground-Water Steering Committee.

Project title: **Clear Lake Aquifer Ground-Water Investigation Study**
Watershed: **Big Muddy C reek/Missouri River**

Nominating Group or individual: **Sheridan County Conservation District**

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Problem Description:
The proposed project will construct and calibrate a digital ground-water model of the Clear Lake aquifer. The aquifer is divided into 5 different regions. These geographical management regions were grouped based on location, aquifer conditions, potential impacts to wetlands and lakes, and irrigation development trends. Several of these areas appear to be close to the limit of irrigation development while others are not. This model will be used to directly manage water development and approval of applications to appropriate water out of the existing Groundwater Reservation. Cooperation with the Fort Peck Tribe and US Fish and Wildlife Service have been beneficial to the Groundwater Reservation and will be essential to any potential GWIP project. The SCCD has compiled water-use records, water-level measurements and climatic records since the early 1980's that will be extremely helpful to any modeling efforts. A primary focus of the model will be to establish an acceptable level of ET-Salvage to determine a safe yield for the Clear Lake aquifer. The model, its results, and a summary report will be available free to the public.

Overview of the magnitude of the problem:

- **A very significant water resource in eastern Montana occupies a broad valley formed by the ancestral Missouri River. The Clear Lake aquifer contains sand and gravel deposited by the ancestral Missouri River and by later glacial meltwater streams. These deposits form a complex aquifer system with some areas capable of supporting high yield irrigation wells.**

- **Lakes and wetlands cover thousands of acres overlying the Clear Lake aquifer. These lakes are important habitat for migratory birds and other wildlife. The U.S. Fish and Wildlife Service (USFWS) Medicine Lake Wildlife Refuge manage many of these lakes and wetlands. The USFWS is concerned that irrigation withdrawals will deplete water from the wetlands and lakes diminishing the value of the habitat. They historically objected to any water development in the area.**

- **The Sheridan County Conservation District (SCCD) was authorized to manage 15,479-acre-feet of water from the Clear Lake aquifer as part of a water reservation in 1994. When originally established, DNRC stipulated that the SCCD could begin permitting for the use of up to 5809 acre-**

feet of the water. Once this cap was reached permitting would be suspended until it was shown that allocating additional water would not negatively impact other water resources. In 2005 the SCCD requested the additional water from DNRC. After further evaluation DNRC increased the allotment to 10,000 acre feet. As the result of these mandates the SCCD has been evaluating and carefully addressing potential concerns related to increased ground-water development through their permitting system. Continued ground-water and surface-water data need to be collected and interpreted to determine if the additional 5,479 acre-feet of water can be developed.

- **The SCCD, through its technical advisory committee, has developed an effective water management and monitoring program that provides data, interpretations, and recommendations to allocate water from the Clear Lake aquifer. Maintaining this monitoring program is critical to evaluate existing and future applications, determining multi-aquifer and evaluating (both quality and quantity) impacts on other water uses. Integrating the GWIP program into the existing water management activities of the SCCD, will result in a water-management model that will assist the technical advisory committee make sound water-management decisions.**

1. **Subdivision** growth rate
    a. Actual number of new lots permitted during the previous 5 1/2 years **25 +**_.
    b. Data source: Doug Smith, Sheridan County Planning office.
    Note: Sheridan County has started to be impacted by Bakken development. Recently about 25 permits for new lots have been approved. In addition, a new application for a 220 unit trailer park to house oil field workers is in the process.

2. **New Wells**
    a. Actual numbers of wells recorded in GWIC during the previous 5 1/2years (212)_.
    b. Data source: MBMG-GWIC
    Note: A recent GWIC download indicates 212 new wells were constructed in the previous 5 1/2 years. This total is about 10 % of the total number of wells drilled in this area. About 50% of the new wells were domestic or stock wells.

3. Designated **Closed Basin**
    a. Is the project area within a Closed Surface Water Basin or a Controlled Ground Water Area Yes____, No _X_**.**
    b. Data source: MBMG, DNRC
    Note: Although the Clear Lake aquifer is not closed; the groundwater reservation is in place managing development of Agricultural water. Other uses must go through the MT DNRC and consider the existing reservation. Several requests for water marketing permits have been made but as of the end of May 2012 no actual applications had been filed with the Glasgow field office.

4. Flood to **Sprinkler** conversion
    a. Very little flood irrigation has ever been developed in this area
    b. Data source: Dept of Ag or **NRCS,**
    Note: prior to the mid 1980s most of the sprinkler irrigation development used high pressure low efficiency nozzles. All of the old wells were converted to low

pressure systems and any new irrigation development has used the higher efficiency sprinklers.

5. Impaired **Water Quality**
   a. Is the surface-water body on the State TMDL, 303(d) list Yes **X**, No ____.
   b. Data source: DEQ website
   Note: Big Muddy Creek is on the 303(d) list.

6. Expansion of **Industrial** water use
   a. New industrial and municipal wells during the previous 51/2 years (19).
   b. Data source: MBMG-GWIC, DNRC water rights or local input (SCCD)
   Note: Six new municipal wells were constructed based on GWIC information. Industrial wells were considered wells in GWIC with water use filed as commercial, industrial, injection or other. There is a significant demand for water to be used in the oil industry for fracking new Bakken oil wells. Operators have contacted the SCCD regarding using reservation water. The reservation water is currently limited to Ag development.

7. Expansion of **Agricultural** water use
   a. Number of new Ag WELLS (Stock and Irrigation) wells during the previous 5 years 34
   b. Dept of Ag, DNRC Water Rights wells and surface withdrawal permits, MBMG-GWIC wells
   Note: 18 % of wells drilled in last 5 years are listed as Stock or Irrigation wells.

8. Population density
   a. Total number of people impacted __**4000**_(population has expanded but no new estimate has been developed)._____
   b. Data source: US Bureau of Census

9. Water Class or usability
   a. Water-quality classification or description Water Quality is variable but is good for most uses.
   b. Data source DEQ and MBMG
   Note: No change from original matrix.

10. Information already known
   a. See reference sheet.
   b. MBMG,

11. System **Complexity**
   a. Is the hydrogeologic system simple and straightforward or is the project scientifically complex? Provide information if possible. The Steering Committee will address this criterion.
   b. DEQ, DNRC, **MBMG**
   Note: The Clear Lake aquifer is a hydrogeologically complex aquifer system. There is little or no surface definition of the underlying buried channel aquifer. As a result it requires extensive drilling to find the boundaries. In addition, not all sites within the boundaries are capable of producing adequate volumes for irrigation. The ancestral Missouri gravels and glacial outwash sand and gravel make up the aquifer system. These permeable units are separated by fine grained leaky confining sediments of variable thickness and leakage potential. The variable hydraulic connection will need additional field work to clearly

understand. In many places the aquifer is poorly defined. The natural discharge to wetlands and evapotranspiration need to be further defined and used to develop a safe yield for irrigation development.

12. County **Growth Plan** in place

a. Does the County have a formal growth plan and is this a high density area Yes __X__, No ____. Low density and part of the county is not zoned.

b. Data source: **Local input SCCD**

13. Contentious/ litigious

a. Is the issue locally sensitive, potentially headed for court? Yes __X___, No _____ **The USFWS and Fort Peck Tribe are very concerned over water development from the Clear Lake aquifer. These concerns could turn into contentious and possibly litigious issues. Other recent issues include the cap set on the water reservation and recent hearings regarding transferring water claimed to have resulted from increased efficiency.**

b. Local input, **City/County Planning Division, Conservation District, NRCS, USFWS**

14. Highly valued **Ecological** water system

a. Is the surface water body a commissioned stream? Are Murphy rights involved? Provide information if possible. The Steering Committee will address this criteria.

b. DNRC, , MT FWP

Note: The Medicine Lake Wildlife Refuge and numerous Waterfowl Production Areas underlain by the Clear Lake aquifer are extremely important to migratory birds and other wildlife. The USFWS manages these lands and works closely with MBMG and SCCD.

15. Basin fill or bedrock **Aquifer Systems** or both

a. Similar to the complexity issue, but allows more direct inclusion of geologic controls. Provide information if possible. The Steering Committee will address this criteria.

b. MBMG, DNRC

Note: The aquifer does not fit either category. The aquifer is a combination of a buried alluvial valley system containing sand and gravel and another buried valley formed by glacial meltwater and composed of glacial sand and gravel. These permeable zones are separated in places with glacial till, lake sediments and deltaic sediments resulting in an extremely complicated hydrogeologic system.

16. Efficiency of effort

a. Adjacent project areas can allow for more efficient investigations. Provide information if possible. The Steering Committee will address this criteria.

b. Data source Map, DEQ, DNRC, MBMG

Note: Coordination with the various MBMG programs, USGS, SCCD, US Fish and Wildlife Service, DEQ, consultants and local residents has resulted in project efficiency. We are using monitoring points established by the MBMG in the 1980's. There are no GWIP projects in this area but we have a lot of information ready to be used by a new project.

17. Diversity of hydrogeology and issues

a. Similar to complexity criteria but emphasizes the need to investigate a wide range of issues. Provide information if possible. The Steering Committee will address this criterion.

b. Data source DEQ, DNRC, MBMG

Note: There are a wide range of issues ranging from economic issues such as crop diversity and productivity, endangered species habitat, Waterfowl production and complicated water rights claimed by the Ft. Peck tribe and USFWS. Managing the aquifer requires a lot of data collection and reduction. The need is to develop a management model that could be queried when new irrigation development is proposed.

18. Controlled groundwater A**rea**

a. Is the project area within a Controlled Ground Water Area? Yes ____, No X_
b. Data source DNRC
   Note: Reservation applies

19. Availability of **Matching Funds**

a. Priority for other funding sources
   i. Are matching funds available Yes __X___, No _____

   ii. Have matching funds been requested but not committed? Such as a grant application that has not been approved.. Yes _X_, No _____. Indicate the source and amount requested.

b. Data source: **SCCD,USFWS,MBMG**

   Note: The SCCD currently receives about $25,000 through a legislative appropriation to monitor the aquifer. In addition they receive about $5,000 annually to assist the USFWS in water resource issues directly related to the reservation . These are currently available cash matches to the potential project. The MBMG and SCCD have been working with the USFW for additional funds to manage the Clear Lake aquifer but have not developed a funding source yet.

10. Information already known

a. Existing hydrogeologic data and reports:

The list of references shown below contains significant geologic and hydrogeologic references pertaining to the Clear lake aquifer. The Clear Lake aquifer and extensions into North Dakota called the Skejmo Lake aquifer and the Ancestral Missouri aquifer are important regional resources. While there has been a lot of regional work on these aquifers relating to their origin and potential water supply the Montana side of the aquifer system still is in need of expansion on existing models developed by Donovan (1988) and Schuele (1998). These models determined the water balance and estimated impacts to lakes and wetlands. The data currently being collected on water use, climate, water level fluctuations, and impacts from oil and gas development form an extremely valuable database for model development and calibration. This information will provide an edge not typically available in resource assessments.

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