FINAL

Union Lake / Lake Sarah Outlet Pump, Forcemain, and Downstream System Operation Manual

Sand Hill River Watershed District
and
Union Lake / Sarah Improvement District

August 10, 1999

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Outlet Pump, Forcemain and
Downstream System
Operation Manual

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Union Lake / Sarah Improvement District

Adopted by the Sand Hill River Watershed District Board of Managers and the Union Lake / Sarah Improvement District Board.

Sand Hill River Watershed District Board

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Chairman Date

Union Lake / Sarah Improvement District Board

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President Date

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

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Nathan P. Dalager, P.E. Date
Registration No. 25309

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Chapter 1

Project Description

Flooding is occurring on Union and Sarah Lakes in Polk County, Minnesota. The lakes have fluctuated as much as 5 - 6 feet above the Ordinary High Water Level. Dozens of cabins have been ruined, damaged, or are threatened, and almost all properties (approximately 286) are suffering from high water damage. 56 properties on these two lakes have been devalued a total of $860,900 by the Polk County Assessor.

The urgency of the Union Lake/ Sarah flooding situation was finally realized through several meetings with concerned property owners, the Red Lake Watershed District (RLWD), Sand Hill River Watershed District (SHRWD), Red River Watershed Management Board (RRWMB), Department of Natural Resources (DNR), Pollution Control Agency (PCA), Board of Water and Soil Resources (BWSR), Polk County, the Lake Improvement District (ULSID), East Polk SWCD, U.S. Corps of Engineers (Corps) and many others. This process involved an analysis of several of the most obvious alternatives that were pre-selected and agreed upon by the above participants. The alternatives consisted of various surface water outlets and/or upstream watershed storage and watershed management strategies.

In addition to suggested alternatives, other apparent outlet alternatives were considered. Initially, all the outlet alternatives were assessed on the basis of general criteria. Each alternative was then presented to the Technical Committee. Each alternative was subjected to an evaluation of several factors including:

- potential environmental impacts
- regulatory complexity (RLWD - SHRWD, DNR, MPCA, etc.)
- political implications
- hydraulic impacts to downstream systems
- water quality issues
- type of outlet (gravity, pumped)
- cost
- technical feasibility

Flood Damage Reduction alternatives such as buyouts, relocation, and watershed management strategies are not considered to be cost effective for Union and Sarah Lakes.

The Union Lake / Sarah Improvement District Board has approved a pumping alternative as recommended in the feasibility study, originating from the southwest area of Union Lake. The basic components of this alternative involve construction of a pumping station at/in Union Lake, and installation of 2,500 feet of buried forcemain crossing under CR 42 and going across USF&W land. The forcemain would outlet into a natural basin with an existing outlet. This natural outlet follows a course to a point near the center of Section 3 in Garden Township, where there is an opportunity to divert the water into another drainage system.

Chapter 2

Operating Plan

2.1 Authorities

The Union Lake / Sarah Lake level reduction and stabilization project was established and constructed by the Union Lake / Sarah Improvement District (ULSID) under the jurisdiction of the Polk County Board of Commissioners.

Permits for construction of the project were granted by the Department of Natural Resources (DNR), Corps of Engineers, Sand Hill River Watershed District (SHRWD), East Polk SWCD, and other agencies. During the permit review process, the operating plan was developed in conjunction with the Red River Basin Flood Damage Reduction Mediation process. Participants included the Union Lake / Sarah Improvement District, Sand Hill River Watershed District, MnDNR, Corps of Engineers, Board of Water and Soil Resources, MnPCA, West Polk SWCD, and others. This operating plan is subject to further review at the request of the above participants, and changes to this operating plan must be agreed to by the above participants.

The SHRWD is responsible for operation of the pump and diversion gate. The SHRWD and the ULSID are jointly responsible for inspection, monitoring, and overall management of the project. However, the ULSID is fiscally responsible for maintenance of the project.

2.2 Downstream Control Points and Elevations

The operation of the outlet pump will depend on the downstream system's ability to handle pumped and local flows. The water surface elevations (flow) at two specific control points in downstream channels will be used to determine whether or not the pump may be operated. The occurrence of downstream channel erosion is an additional factor when determining if the pump may be operated. If flows at either control point exceed the maximum allowed elevation or if erosion is documented downstream, the pump must be turned off and gate closed. The two control points and the erosion criteria are:

1. Two 36" CMP culverts located at a north-south township road crossing just north of the center of Section 10 in Garden Township. The water surface elevation shall not exceed .5 foot above the crown (top) of the pipes. Pumping may resume when the water surface elevation drops to .5 feet below the crown of the pipe.

2. The water surface elevation at the USGS gage in Climax, MN shall not exceed 12 feet. Pumping may resume when the water surface elevation drops to 11 feet.
3. If reports of overland flow over exposed soil or downstream channel erosion are received, the pump shall be turned off and the DNR, SHRWD, and ULSID notified of the report. If after site inspection, it is determined by the DNR that pumped water from Union and Sarah Lake contributes to the cause of the erosion, the pump must remain off until the eroding area is stabilized. Costs associate with the repair of the erosion shall be the responsibility of the ULSID.

2.3 Monitoring Plans

All provisions and conditions within the Water Quality Monitoring Plan shall be followed.

2.4 Pumps / Diversions / Gates

Pumps: The pump station and controls are located in the southwest area of Union Lake in the SW1/4, Section 35, Woodside Township. The system operation and capacity has been designed to operate in two phases. The first phase will consist of a large pump discharging at no more than 20 cubic feet per second (~ 9,000 gallons per minute) during the Drawdown Phase of the lake level stabilization effort. Once the final target water surface elevation of 1211.60' (NGVD, 1929) has been achieved, a smaller pump with a capacity less than 10 cfs (~4,500 gpm) will be installed to manage lake levels as described during the Maintenance Phase.

- Drawdown Phase: During this phase, the pump will be operated at no greater than 20 cfs or 9000 gpm as long as the maximum downstream water surface elevations listed in Section 2.2 are not exceeded, downstream erosion does not occur, and the discharge rate is adjusted to eliminate overland flow over exposed soil. All pumping shall cease when the water surface elevations of Union and Sarah Lake reach 1214 feet above mean sea level (NGVD, 1929) and the USACE shall be notified that said elevation has been attained. The USACE shall determine the presence and boundary of lake-adjacent wetlands to evaluate whether continued pumping would drain or otherwise adversely affect wetlands, and review monitoring data. If pumping below 1214 feet would result in adverse effects on wetlands beyond the 2.7 acres identified by the USACE, or if there is evidence of additional adverse downstream impacts, then a separate permit application shall be submitted by the permittee to the USACE. This additional application shall be evaluated by the USACE and a permit decision made before pumping may continue. After receiving written authorization from the USACE that pumping may proceed, pumping in accordance with the drawdown phase may continue until the final target water surface elevation of 1211.60' is attained. Once attained, any further pumping shall be conducted as stipulated within the Maintenance Phase provisions below.

- Maintenance Phase: Once the target elevation has been achieved, no pumping shall occur unless and until lake surface elevations rise to 1212.60'. At this elevation, maintenance phase pumping shall only be allowed provided all conditions within Section 2.2 and 2.3 of this Operating Plan are met. Maintenance phase pumping shall not exceed 10 cfs or such rate which eliminates overland flow over exposed soil, whichever is more restrictive. Maintenance Phase pumping shall again cease upon attaining the target water surface elevation of 1211.60'. Any change in the above elevations, including intermediate elevations within the drawdown phase, shall only be allowed with written authorization from the USACE and DNR.

At the end of any scheduled pumping period, the pumping rate over the discharge period shall be reduced by approximately 1 cfs per day.

Diversion and Gate: All culverts fitted with control gates shall be open while the pump is in operation, and closed within 24 hours after pumping has ceased, remaining closed until pumping resumes. During the drawdown and maintenance phase, additional flow from pumped water shall be blocked from entering the natural waterway west of the diversion, between the diversion and Bungham Lake. When pumping has ceased, said blockage shall be removed where applicable.

2.5 Pumping Schedule

The pumping schedule shall be restricted to those periods authorized within all effective permits. Where authorized periods within those permits conflict, the most restrictive pumping schedule and rate shall apply.

Chapter 3

System Operations

Water levels on Union and Sarah Lakes are the product of both short term and long term climatic and hydrologic conditions. While the lake levels may rise and fall relatively slowly, the same is not true for the downstream systems. It is imperative that system operations be well coordinated between the SHRWD and the ULSID. Working relationships and assignments must be arranged prior to pump operation. Care must be taken to observe the downstream trigger levels during spring runoff and after local rainfall events.

4/99

BEFORE THE UPPER MINNESOTA WATERSHED DISTRICT
BOARD OF MANAGERS

PETITION FOR PROJECT
PURSUANT TO MINN. STAT. §103D.705

Petitioner, the City of Beardsley, states as follows:

1. That the City of Beardsley proposes to turn over and make a project of the Upper Minnesota Watershed District, a project known as the Beardsley Dry Lake Diversion Project. The purpose of the project was to provide a water level control structure and outlet to Dry Lake so as to control flood waters and to provide protection from flood damages.

2. The description of the property where the project passes over or is located is as follows:

That part of the Northeast Quarter of the Southeast Quarter, Section 11, also with that part of the South Half of Section 12, Township 124 North, Range 49 West, Big Stone County, Minnesota, also with that part of the South Half of Section 7, also with that part of the South Half of the Southwest Quarter of Section 8, Township 124 North, Range 48 West, Big Stone County, Minnesota, described as follows:

Commencing at the southwest corner of said Section 12; thence North 00 degrees 05 minutes 42 seconds East, assumed bearing, along the west line of said Section 12 a distance of 1597.61 feet to the point of beginning of the center line to be described; thence North 82 degrees 50 minutes 58 seconds West 34.90 feet to the outlet structure; thence reversing South 82 degrees 50 minutes 58 seconds East 504.84 feet to a manhole; thence South 83 degrees 25 minutes 59 seconds East 995.87 feet to a manhole; thence South 82 degrees 51 minutes 18 seconds East 1000.77 feet to a manhole; thence South 83 degrees 08 minutes 14 seconds East 977.75 feet to a manhole; thence South 82 degrees 13 minutes 45 seconds East 1018.57 feet to a manhole; thence South 83 degrees 04 minutes 00 seconds East 877.77 feet to the intersection with the range line between said sections 12 and 7 distant 980.56 feet North 00 degrees 06 minutes 12 seconds East from the southeast corner of said Section 12; thence continuing South 83 degrees 04 minutes 00 seconds East 122.20 feet to a manhole; thence South 82 degrees 41 minutes 47 seconds East 995.83 feet to a manhole; thence South 83 degrees 07 minutes 53 seconds East 995.31 feet to a manhole; thence South 82 degrees 30 minutes 00 seconds East 1005.30 feet to a manhole; thence South 83 degrees 09 minutes 32 seconds East 1000.03 feet to a manhole; thence South 82 degrees 22 minutes 01 seconds East 1007.10 feet to a manhole; thence South 82 degrees 59 minutes 50 seconds East 114.90 feet to the intersection with the east line of said

Section 7 distant 451.45 feet North 01 degrees 54 minutes 09 seconds East from the southeast corner of said Section 7; thence continuing South 82 degrees 59 minutes 50 seconds East 871.73 feet to a manhole; thence South 82 degrees 48 minutes 03 seconds East 914.59 feet to a manhole; thence continuing South 82 degrees 48 minutes 03 seconds East 37.47 feet, more or less, to an angle point; thence North 52 degrees 11 minutes 09 seconds East 421.20 feet, more or less, to an angle point; thence North 05 degrees 11 minutes 41 second East 362.17 feet, more or less, to a control structure; thence North 50 degrees 11 minutes 41 seconds East 264 feet, more or less, to the inlet structure and said center line there terminating.

3. That the general description of the part of the watershed district that will be affected is that area around and in the City of Beardsley affected by the drainage from Dry Lake.

4. That there was a necessity for the project to provide a controlled outlet to Dry Lake and to avoid flooding damages to neighboring property and it is the intent of this Petition to have the operational plan for this project under the supervision of the Upper Minnesota River Watershed District.

5. That the proposed project and operational plan is and will be conducive to public health, convenience, and welfare.

6. That the Petitioners will pay all costs and expenses that may be incurred if the proceedings are dismissed or the project and operational plan is not transferred to the Upper Minnesota River Watershed District.

Dated this 20 day of MARCH, 1998.

CITY OF BEARDSLEY

By _____

Its Mayor

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