

# interoffice MEMORANDUM

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**To:** TS Todd Sando, P.E., State Engineer  
BE Bruce Engelhardt, P.E., Director, Water Development Division  
JP John Paczkowski, P.E., Chief, Regulatory Section

**From:** LCA Laura Ackerman, Water Resource Engineer

**Subject:** Application to Drain No. 3863 – Devils Lake East End Outlet

**Date:** March 22, 2012

Application to Drain No. 3863 was received from Governor Jack Dalrymple, Chairman of the North Dakota State Water Commission (SWC), for the construction of the Devils Lake East End Outlet (EEO) located northwest of Tolna, ND in Ramsey, Benson, and Nelson Counties (see attached map). The proposed EEO will pump water at a maximum rate of 350 cubic feet per second (cfs) from East Devils Lake to Tolna Coulee, which is a tributary of the Sheyenne River. The purpose of this project is to prevent further flood damage resulting from the high water levels experienced around Devils Lake and to reduce the risk of a natural overflow to the Sheyenne River.

Once completed, the EEO will be operated in conjunction with the existing Devils Lake West End Outlet (WEO) (Drain Permit No. 3457), which was upgraded to a maximum capacity of 250 cfs in 2010. This will bring the total discharge capacity from the two pumped outlets to 600 cfs. The two pumped outlets would also be operated in conjunction with the proposed Stump Lake Gravity Flow Emergency Water Transfer Channel (later referred to as SLO for “Stump Lake Outlet) (Application to Drain No. 3864). As designed, flows from the SLO could range from 27 cfs at a lake elevation of 1453.0 feet to 668 cfs at a lake elevation of 1458.0 feet. (All elevations included in this memo are referenced to NGVD 29. To convert from NGVD 29 to NAVD 88, add 1.2 feet.)

## Project Description

The EEO has an aggressive construction schedule with operation scheduled to begin on June 1, 2012. The total cost is estimated to be between \$50,000,000 and \$70,000,000, including owner furnished equipment and materials. The SWC will provide pipe (Contract 1), pumps (Contract 2), and valves (Contract 3) for the EEO under separate pre-purchase contracts. There will be four (4) construction contracts for the EEO: Contract 4 will be a clearing and grubbing contract, Contract 5 will be a pipeline installation contract, Contract 6 will be construction of an intake pump station, and Contract 7 will be construction of the outlet structures.

The new intake and pump station will be located in the NE $\frac{1}{4}$  NW $\frac{1}{4}$  of Section 8, Township 151 North, Range 62 West (Odessa Township), Ramsey County. The intake structure will withdraw water from the southern end of East Devils Lake. The pump station will consist of four 75-cfs

pumps and one 50-cfs pump. The minimum operating level of the intake structure will be elevation 1446.3 feet (NGVD 29).

The pump station will discharge water into a 96-inch diameter pipeline. The pipeline starts in Section 8, Township 151 North, Range 62 West, Ramsey County (Odessa Township) and Benson County (Minco Township). It continues through Sections 9, 10, 11, 13, 14, and 24, Township 151 North, Range 62 West (Minco Township), Benson County and ends in Section 19, Township 151 North, Range 61 West (Leval Township), Nelson County. The beginning 9,314 feet of pipeline will be comprised of a steel pipe and the remaining 18,075 feet will be reinforced concrete pipe. The total length of the pipeline is about 5.2 miles. There will be a minimum 100-foot wide permanent easement along the pipeline alignment.

The outlet structure will be located in the SW¼ NW¼ of Section 19, Township 151 North, Range 61 West (Leval Township), Nelson County. The pipeline will discharge water into a rock filter structure. Water will then flow into the terminal structure, which will discharge into Tolna Coulee. Water will flow about 12 miles through Tolna Coulee before discharging into the Sheyenne River in the NE¼ of Section 30, Township 150 North, Range 60 West (Osago Township), Nelson County.

### **The Hearing, Comments, and District's Decisions**

This application has been determined by the State Engineer to be of both statewide and interdistrict significance. NDCC §61-32-03 requires the State Engineer to refer the application “to the water resource district or districts within which is found a majority of the watershed or drainage area of the...lake...”. The majority of the project watershed was determined to lie in Ramsey and Towner Counties. Therefore, the Ramsey and Towner County Water Resource Districts (WRD) have the joint authority to either approve or deny the permit. In accordance with NDAC §89-02-01-09.1, the Ramsey and Towner County WRDs held a public hearing on December 1, 2011 in Devils Lake, ND.

At the public hearing, the Towner County WRD was represented by Kent Vesterso, Randy Benson, and John Elsperger. Brian Aanstad, Paul Becker, Duaine Ash, Dan Webster, and Jim Berg represented the Ramsey County WRD. Bruce Gibbons, attorney for both WRD's, was also present. SWC and Office of the State Engineer staff, John Kelsch, Aaron Carranza, and Laura Ackerman, were in attendance. Also present were Ben Varnson, Mike Donohue, and Gene Gehrke from the Nelson County WRD and John Beckstrand, Ken Hoffert, and Brian Maddock from the Benson County WRD.

Kelsch, project manager for the SWC, gave a presentation explaining the physical aspects of the design. He also discussed the possible affects of the EEO on flooding in the Devils Lake Basin and on the probability of an overflow at the Tolna Coulee Control Structure, which is located at the natural outlet location for Devils and Stump Lakes (transcript p. 7-17).

The floor was then opened for public comment and three individuals provided oral testimony. Pat Hurley, from Litchville, ND (Barnes County), expressed concern about downstream flooding

along the Sheyenne River and asked if the pumps would be shut off when the river was flooding. Kelsch stated that during flooding conditions, the pumps would be shut off (transcript p. 36-38).

Dick Johnson, representing the City of Devils Lake, stated that initially the City was against the EEO, but has since changed their position because any water off the lake is beneficial. He stressed that the pumps need to remain running and they should not be shut off every time it rains. The City's primary concern is how the three outlets (WEO, EEO, SLO) would be managed. The operation plan should allow for meaningful amounts of water to be taken off the lake (transcript p. 48-51).

Ron Hoverson, Griggs County Commissioner, questioned whether or not road crossings in Barnes or Griggs Counties would need to be upgraded. According to Kelsch, the additional 350 cfs in the Sheyenne River should not affect crossings downstream of Nelson County (transcript p. 51-54).

At the end of the hearing, the Ramsey and Towner County WRDs decided that the hearing record would remain open for another 15 days until December 16, 2011, for people to submit written comments. Written comments were received from the North Dakota Department of Transportation (DOT), People to Save the Sheyenne (PTSTS), and Madeline Luke.

The DOT stated in their comments that the EEO should have no adverse effects on the state highways; however, there is concern that some of their structures could be impacted. If any work needs to be done on highway right-of-way, appropriate permits and risk management documents will need to be obtained from DOT District Engineer Wayde Swenson.

PTSTS submitted comments regarding the proposed operating plan for the EEO. Their comments state that the operating plan is completely inadequate in explaining the project itself and the effects of operating the EEO. In particular, they state that the operating plans fails to include the factual and scientific data and analysis necessary to describe how the project would operate and what the downstream effects would be on the following: the river and its critical infrastructure; the aquatic life on the river and how many species would survive; the riparian ecology and the damage that would result to it; the cost of treating Devils Lake water for municipal use; and all of the other effects that could limit the beneficial uses of the river. They ask that the SWC be required to submit a detailed analysis of its operating plan, including impacts to the Sheyenne River and to the residents who live along it.

Madeline Luke, from Valley City, ND, stated in her comments that the EEO's operating plan is a statement of general principle, which is meaningful only with specific provisions that support the principles. Regarding the protection of aquatic life, a valid baseline is required so that Sheyenne River species-specific water standards can be established. She states that there is no monitoring plan either for water quality standards or biota integrity and there are no plans for altering the EEO should water quality standards be violated or biota damage be found. She also comments that the protection of downstream infrastructure requires establishment of a baseline state, modeling of the river at different flows, and trigger points at which flow must be stopped. Mitigation should come before any water flows into the Sheyenne River. Her final statement is that the composition of the present Devils Lake Advisory committee is heavily weighted towards

the Devils Lake area. It should equally represent Devils Lake and the Sheyenne River Valley interests with participation from stakeholders in the Red River Valley to include Minnesota and Canada.

Application to Drain No. 3863 was approved by the Ramsey and Towner County WRD's on January 19, 2012. No additional conditions were attached to the permit by either WRD.

### **Analysis**

NDCC § 61-32-03 requires any person, before draining a pond, slough, lake, or sheetwater, or any series thereof, which has a watershed area comprising 80 acres or more, to first secure a permit. The permit application must be submitted initially to the State Engineer. The State Engineer shall refer the application to the water resource district or districts in which a majority of the watershed or drainage area of the pond, slough, lake, or sheetwater is located for consideration and approval. The State Engineer must give final approval to applications proposing drainage of statewide or interdistrict significance. A permit may not be granted until an investigation discloses that the quantity of water that will be drained will not flood or adversely affect downstream lands. If the investigation shows that the proposed drain will flood or adversely affect downstream lands, the water resource board may not issue a permit until flowage easements are obtained.

Devils Lake is a meandered lake. In addition to obtaining a permit to drain under NDCC § 61-32-03, NDCC § 61-15-08 requires the consent of the State Engineer to drain a meandered lake. A permit granted under NDCC § 61-32-03 may constitute the consent required under NDCC § 61-15-08; however, NDCC § 61-15-08 gives the State Engineer additional authority, discretion, and flexibility to consider factors other than those identified in NDCC § 61-32-03 and rules implementing that section when an application proposes drainage of a meandered lake (see also *North Dakota State Water Commission v. Cavalier County Water Resource District*, 332 N.W.2d 254, 258 (ND 1983) (the state has authority to control the drainage of navigable lakes)).

In the State Engineer's evaluation of an application of interdistrict or statewide significance, the State Engineer considers all relevant documentary information and oral testimony given for the water resource board's consideration. In addition, the State Engineer may also use any information in the State Engineer's files and records or engineering information developed or obtained through investigation of the project area by the State Engineer's staff. The State Engineer may also request information and comment from independent sources (NDAC § 89-02-01-09.4). In evaluating this application, all the information given for the water resource board's consideration and information in the State Engineer's files and records was considered.

NDAC § 89-02-01-09.2 gives the factors the State Engineer must consider in the analysis of an application to drain, which has been determined to be of statewide or interdistrict significance. The eight factors are:

1. The volume of water proposed to be drained and the impact of the flow or quantity of this water upon the watercourse into which the water will be drained.

2. Adverse effects that may occur to the lands of lower proprietors. This factor is limited to the project's hydrologic effects such as erosion, duration of floods, impact of sustained flows, and impact on the operation of downstream water control devices.
3. The engineering design and other physical aspects of the drain.
4. The project's impact on flooding problems in the project watershed.
5. The project's impacts on ponds, sloughs, or lakes having recognized fish and wildlife values.
6. The project's impact on agricultural lands.
7. Whether easements are required.
8. Other factors unique to the project.

**Factor #1 - The volume of water proposed to be drained and the impact of the flow or quantity of this water upon the watercourse into which the water will be drained.**

The maximum discharge for the EEO will be 350 cfs. Two crossings in Nelson County between the EEO and the Sheyenne River, County Road #4 and the crossing just north of Tolna, need to be upgraded to convey the additional 350 cfs (transcript p. 45). In regards to Factor #1, the Ramsey County WRD, in a December 29, 2011 letter, asked the SWC if there was a maximum flow specified for the Sheyenne River which would cause the pumps to be shut off and if flowage easements are going to be obtained for excess flows. The SWC's response, dated January 6, 2012, stated that a maximum flow for the Sheyenne River has not been set. There is still some uncertainty with the proposed SLO and the amount of water that may be released by all three outlets. The channel capacity of the Sheyenne River in some areas upstream of Baldhill Dam is approximately 600 cfs, although most of the channel can carry significantly more. There is anticipation that natural flows in the Sheyenne River combined with flows from one or more of the outlets may exceed bank capacity in some areas. The SWC plans to address flooding caused by the outlets through their mitigation plan. Flowage easements may become a part of the mitigation plan, but initially will be handled through the application process in the mitigation plan because of the unknown base flow quantities in the Sheyenne River and unknown combined outlet quantities.

The preliminary operating plan for the EEO limits operation of the pumps in order to protect downstream critical infrastructure. Operation is also limited by a downstream water quality constraint for the protection of aquatic life, which requires the concentration of sulfate to be less than 750 mg/l. The operating plan for the WEO specifies the same constraints.

Downstream flows will be monitored with existing gages on the Sheyenne and Red Rivers at the following locations: Flora (upstream of WEO), Bremen (downstream of WEO), Warwick, Cooperstown, Below Baldhill Dam, Lisbon, Sheyenne River Diversion near Horace, Harwood, Halstad, and Pembina. Another gage will be installed along the Tolna Coulee to monitor flows.

The sulfate monitoring locations have not been finalized, but they could include any of the previously mentioned sites along with possible locations at Devils Lake, Lake Ashtabula, and near the Valley City water treatment plant.

It should be noted that operation of the outlets is overseen by the Devils Lake Outlet Management Advisory Committee (Committee), which includes ten people. The Committee is comprised of three members appointed by the Governor representing interests affected by downstream impacts of operating the outlets, the State Engineer or designee, one member appointed by the Red River Joint Water Resource Board, one member appointed by the Devils Lake Joint Water Resource Board, one member appointed by the Upper Sheyenne River Joint Water Resource Board, one county commissioner from Ramsey County, one county commissioner from Benson County, and one representative of the Spirit Lake Nation.

**Factor #2 - Adverse effects that may occur to the lands of lower proprietors. This factor is limited to the project's hydrologic effects such as erosion, duration of floods, impact of sustained flows, and impact on the operation of downstream water control devices.**

The Devils Lake Outlet Mitigation Plan addresses possible adverse effects that may occur to downstream property. If a downstream landowner becomes aware of a possible problem on their land that may be related to Devils Lake outlet operations, they should document the problem, complete an Outlet Mitigation Application form, and submit it to the SWC. SWC staff will review the application and determine the impact, if any, from the outlets through the analysis of the known flows in the river and the known flows from any of the outlets during the time period when the problem occurred. The Devils Lake Outlet Mitigation Plan and application form are available on the SWC website.

**Factor #3 - The engineering design and other physical aspects of the drain.**

A description of the design is provided under the "Project Description" section above. Professional engineers, registered to work in the state of North Dakota, have designed the EEO. These engineers work closely with other professional engineers, also registered to work in the state of North Dakota, as well as staff at the SWC. Therefore, the design meets accepted engineering standards and practices.

**Factor #4 - The project's impact on flooding problems in the project watershed.**

Operated at full capacity for seven months (April to November), the EEO would be capable of removing 145,000 acre-feet of water. Using a more conservative five-month operating time period would result in 104,000 acre-feet of water removed from Devils Lake by the EEO. If both the EEO and WEO operated for five months, approximately one foot of water would be removed at a lake elevation of 1454.0 feet.

Besides having a beneficial effect on the Devils Lake Basin, the EEO would also benefit the downstream landowners along the Sheyenne and Red Rivers by decreasing the likelihood of water spilling uncontrollably at the natural outlet location where the water quality is the poorest in comparison to the rest of the lake. The SWC's objective is to remove water from Devils Lake

while maintaining river levels and water quality at acceptable levels downstream. The EEO is part of the “three-pronged approach”. When combined with upper basin storage and infrastructure protection, it is considered an important part of the solution to the flooding problems experienced in the Devils Lake Basin.

**Factor #5 - The project’s impacts on ponds, sloughs, or lakes having recognized fish and wildlife values.**

As stated above under Factor #1, operation of the EEO (and WEO) is limited by a downstream water quality constraint for the protection of aquatic life, which requires the concentration of sulfate to be less than 750 mg/l.

The intake structure for the EEO has a minimum operating level of elevation 1446.3 feet. Draining the lake down to this elevation will protect the Devils Lake fishery. During the permit reconsideration hearing for Drain Permit #2986, the original drain permit for the WEO, Terry Steinwand, Chief of the ND Game and Fish Department’s Fisheries Division (currently Director of NDGF), agreed that constraining the operation of the WEO to those periods when the level of Devils Lake is above elevation 1445.0 feet would adequately limit the WEO’s potential to significantly impact the fishery.

The transfer of biota will be minimized by the rock filter structure. The April 2003 Integrated Planning Report and Environmental Impact Statement, prepared by the U.S. Army Corps of Engineers (USACE) for the federal Pelican Lake outlet project (Pelican Lake outlet report), states that a sand filter would, to the extent practical, prevent fish, plants, invertebrates, algae, and other organisms from leaving Devils Lake via the outlet (p. 6-81). Also during the permit reconsideration hearing for Drain Permit #2986, Steinwand testified that he was involved in a joint study with US and Canadian scientists and water quality experts to determine the impacts of a diversion of water from Devils Lake to the Red River. The study results concluded that there is a minimal risk of aquatic biota transfer through an outlet. A June 26, 2003 recommendation memorandum for Drain Permit #2986, written by Julie Prescott (SWC engineer), references another biota transfer study. This study, which was conducted by Peterson Environmental Consulting, Inc and funded by the USACE, determined that, based on all available information, it is highly unlikely that downstream habitats would be substantially affected as a result of biota transfer caused by a Devils Lake outlet, due to the high degree of similarity between the species already present in the Devils Lake and Hudson Bay basins. A 1997 investigation report conducted by the ND Geological Survey states that water from Devils and Stump Lakes has overflowed into the Sheyenne River at least six times in the last 10,000 years BP (before present). At least two major flood events occurred between the years 7,800 to 8,700 BP. Two more flood events happened over the course of the next 400 years (7,800 to 7,400 BP). At least one additional fluvial event occurred prior to 1,100 year BP. Therefore, interbasin biological exchange by means of a natural overflow, though not frequent in occurrence, has already taken place.

**Factor #6 - The project’s impact on agricultural lands.**

The removal of water upstream of the EEO will benefit agricultural lands in the Devils Lake Basin. Impacts to agricultural land downstream of the EEO will be addressed with the Devils Lake Outlet Mitigation Plan. Agricultural land within the project alignment will go back to normal use. Landowners will be paid for current and future crop damages as agreed to in easements.

**Factor #7 - Whether easements are required.**

Easements have been acquired by the SWC for the land on which the EEO is located. As previously stated under Factor #1, the SWC plans to address flooding caused by the outlets through their mitigation plan. Flowage easements may become a part of the mitigation plan, but initially will be handled through the application process in the mitigation plan because of the unknown base flow quantities in the Sheyenne River and unknown combined outlet quantities.

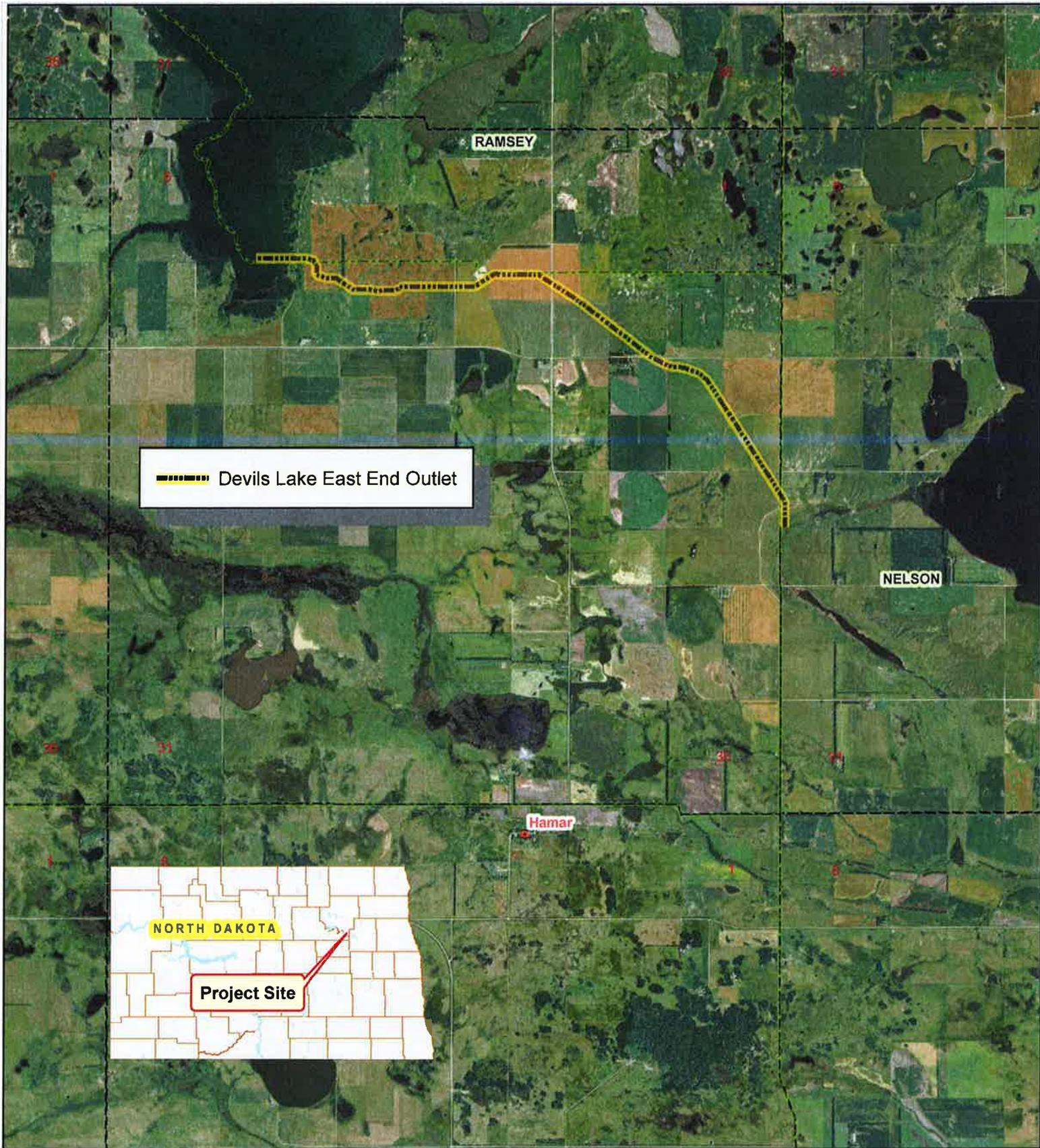
**Factor #8 – Other factors unique to the project.**

Currently, Devils Lake is about 4.5 feet from an uncontrolled release of water at the Tolna Coulee Control Structure, which is located at the lake's natural outlet location. Any quantity of water that can be discharged from any of the outlets helps to reduce the risk of an uncontrolled overflow at the natural outlet. The maximum design discharge of the Tolna Coulee Control Structure is 3,000 cfs. Water released by the Tolna Coulee Control Structure would have the poorest water quality in the lake. When one considers the risk between controlled outlets and an uncontrolled natural overflow, it is apparent that an uncontrolled overflow of the lake would be more devastating to downstream landowners and cities.

**Recommendation**

Based on my review of this project, it is my recommendation that Application to Drain No. 3863 be approved by the State Engineer, subject to the following conditions.

1. This permit authorizes the permit holder to drain water from Devils Lake at a rate not to exceed 350 cfs. Expansion of the project's capacity would require a new permit.
2. The State Engineer reserves the right to order modifications to the project if the State Engineer determines that modifications are required to protect downstream property or fish and wildlife resources.
3. Drainage is only authorized when the level of Devils Lake is above 1445.0 feet (NGVD 29).
4. The Permittee shall implement the Devils Lake Outlet Mitigation Plan for the duration of the project. The State Engineer must approve any modification of the Devils Lake Outlet Mitigation Plan.



ND State Water Commission  
T151N, R61W Sec. 19

Ramsey, Benson, & Nelson Co.  
Permit No. 3863



