

**RESOLUTION NO. 24-017**  
**RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT**  
**BOARD OF MANAGERS**

**Approving Task Order No. 46 to analyze potential modifications to the Duck Lake Outlet**

Manager \_\_\_\_\_ offered the following resolution and moved its adoption, which was seconded by Manager \_\_\_\_\_:

**WHEREAS** the outlet of Duck Lake has been modified numerous times over the decades, lowering the runout elevation from 914.4 to 913.45, and

**WHEREAS** the City of Eden Prairie was going to replace the existing outlet structure with the Duck Lake Road Project and restore the runout elevation to 914.4, and

**WHEREAS** the Minnesota Department of Natural Resources reversed its decision to restore the runout elevation to the 914.4, stating that the 913.45 is considered the historic elevation, and

**WHEREAS** the Minnesota Department of Natural Resources, in meetings with the staff of the Riley Purgatory Bluff Creek Watershed District indicated that while they would not permit a change in runout elevation they may be receptive to a change in the hydraulics of the outlet, and

**WHEREAS** by changing the outlet characteristics, it may be possible to mimic the hydrograph that existed prior to the installation of the most recent outlet structure, and

**WHEREAS** the Duck Lake Association has requested that the Riley Purgatory Bluff Creek Board of Managers evaluate the existing outlet configuration.

**NOW THEREFORE BE IT RESOLVED** that the Riley Purgatory Bluff Creek Watershed District Board of Managers hereby approves tasks 1 through 5 from Task Order 46 for Barr Engineering to evaluate different outlet configurations, engage with stakeholders, and provide a technical memorandum with conceptual figures for a cost not to exceed \$16,500.

The question was on the adoption of the resolution and there were \_\_ yeas and \_\_ nays as follows:

Yea                      Nay                      Abstain                      Absent

**CRAFTON**

**DUEVEL**

**KOCH**

**PEDERSEN**

**ZIEGLER**

Upon vote, the president declared the resolution adopted.

Dated: March 13, 2024.

\* \* \* \* \*

I, Tom Duevel, secretary of the Riley Purgatory Bluff Creek Watershed District, do hereby certify that I have compared the above resolution with the original thereof as the same appears of record and on file with the District and find the same to be a true and correct transcription thereof.

IN TESTIMONY WHEREOF, I set my hand this \_\_\_\_ day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Tom Duevel, Secretary

**TASK ORDER No. 46: Duck Lake Outlet Modification**  
**Pursuant to Agreement for Engineering Services**  
**Riley Purgatory Bluff Creek Watershed District and BARR Engineering Company.**  
**January 31, 2024**

This Task Order is issued pursuant to Section 1 of the above-cited engineering services agreement between the Riley Purgatory Bluff Creek Watershed District (District) and BARR Engineering Company (Engineer) and incorporated as a part thereof.

1. Background:

Duck Lake lies entirely within the boundaries of the City of Eden Prairie. The watershed area contributing to Duck Lake is 233 acres including the lake surface area of 41 acres. Duck Lake does not have any upstream lakes contributing flow. The flow from Duck Lake exits through a control structure into a storm sewer pipe that drains into Purgatory Creek. Most of the watershed underwent development from agricultural use to residential land use between the early-1960's and late-1980's.

The Duck Lake outlet structure, located on property owned by Twin Cities & Western Railroad Company, was constructed in 1969 and consisted of a box weir structure upstream of a 15-inch CMP; the control elevation for the lake was 914.4. In 1979 the Department of Natural Resources denied an application to modify the structure. However, despite the denial, the outlet was modified sometime between 1979 and 2011 to remove the weir upstream of the outlet pipe and lower the control elevation to 913.45. In 2014 the city of Eden Prairie undertook the outlet replacement by surveying the elevation of the discharge pipe at the outlet and replacing it with a new discharge pipe at the same elevation (913.45). DNR staff indicated to RPBCWD that no DNR permit was applied for or issued to modify the Duck Lake outlet in 2014.

At the November 3, 2021 board meeting RPBCWD managers heard comments from several residents about the control elevation of Duck Lake and its potential impact on the ecology of the lake. Following the November 2021 board meeting Barr completed an environmental impact review (Barr, 2021) that consisted of reviewing the history of the lake outlet, the lake's water surface level, water quality, vegetation, and fisheries.

Findings were discussed with the city of Eden Prairie, RPBCWD, and DNR staff on October 11, 2022. The DNR confirmed that the DNR goal is to establish runout elevations for lakes, and since it has been in place for so long, the DNR cannot approve raising the outlet elevation back to the 1969 elevation (914.4) without a significant public engagement process and riparian owner support. The DNR mentioned they might be able to permit a revised outlet if the runout elevation was unchanged but would need additional technical information before advancing the discussion.

RPBCWD has continued collaborating with the city of Eden Prairie about potential implementation of modifications. The city indicated a willingness to implement modification if RPBCWD would assist with identifying the needed improvements. In addition, the city approached the Twin Cities & Western Railroad Company, the property owner where the outlet is located, to inquire about access permission. At this time, it remains unclear if Twin Cities & Western Railroad Company would allow access to implement any modifications.

In 2023, the Eden Prairie Duck Lake Association advocated for RPBCWD to undertake a

holistic lake management, including an analysis to determine what could potentially be done detain more water in the lake, similar to conditions before the 2014 modification. The holistic lake management plan was discussed at the December 13, 2023 Board of Mangers meeting. One outcome was an interest in potentially looking at the lake level management separate from the holistic study.

2. Description of Services:

The purpose of this Task Order is to evaluate modifications to the Duck Lake outlet that consist of maintaining the existing runout elevation of 913.45, but better approximating the stage-duration curve before the outlet was modified in 2014. The RPBCWD stormwater model will be used to evaluate the variability in water levels over a continuous period of observed rainfall events. Results will be shared with the city of Eden Prairie and the DNR. Finally, concept-level figure(s) will be prepared to illustrate potential outlet modifications.

3. Scope of Services:

Engineering services included in this task order shall include:

**Task 1. Evaluate Duck Lake Outlet Configurations**

Water levels in Duck Lake fluctuate due to variability in numerous variables including precipitation, groundwater, and evaporation. As a result, it is difficult to determine the impact of the outlet configuration on the water levels in the lake by modeling a single design rainfall event. Therefore, the RPBCWD stormwater model will be used to complete continuous simulations of observed rainfall to generate a times series of water levels in Duck Lake for the pre-2014 outlet condition and two potential outlet configurations.

Model simulations for the period between 1979 and 2014 will be completed assuming the outlet is free from debris and plugging, and assuming a partial plugged condition, if appropriate, to approximate observed lake levels between 1979 and 2014. While partial plugged conditions of the outlet may vary over time (i.e., more leaves and vegetation in the fall or ice blockage in the spring), model simulations will not simulate the variation in conditions at the outlet throughout the simulation. In other words, the model will assume a constant partial plugged condition for the duration of the simulation that best fits observed lake levels between 1979 and 2014. The two simulations will then be used to develop stage-duration curves for Duck Lake.

Barr will then modify the model to evaluate two outlet configurations .

1. One outlet configuration that approximates the stage-duration curve for Duck Lake assuming the outlet is fully open and free of debris between 1979 and 2014.
2. One outlet configuration that approximates the stage-duration curve for Duck Lake accounting for partial plugging of the outlet between 1979 and 2014.

While this methodology accounts for how the lake responds to past patterns of recorded rainfall that occurred over a wide range of climatic conditions and allows the duration curves to be based on consistent time step interval, it does not account for land-use changes over the simulation period. Barr assumes that the outlet configurations will be evaluated based on current land use within the watershed as well as the current Duck Lake Road configuration.

**Task 2. Stakeholder Coordination**

During the process of evaluating modifications to the Duck Lake outlet Barr will facilitate one working meeting with city of Eden Prairie and DNR staff to present results and solicit feedback on the findings. It is assumed that the meeting will be 2-hours and be virtual. Barr assumes that if needed, District staff will coordinate with property owners, the railroad, and the Duck Lake Association, and Barr staff will not participate in those coordination discussions.

### **Task 3. Concept Development**

The assessment of modifications to the Duck Lake outlet structure will include a description and concept-level figures for up to 2 options.

1. One outlet configuration that approximates the stage-duration curve for Duck Lake assuming the outlet is fully open and free of debris between 1979 and 2014.
2. One outlet configuration that approximates the stage-duration curve for Duck Lake accounting for partial plugging of the outlet between 1979 and 2014.

Figures will include a cross section and plan view (if needed) for each concept evaluated.

### **Task 4. Documentation**

Barr will provide the District a brief technical memorandum summarizing the stormwater model modifications and simulation results, stakeholder coordination, and concepts for modifications to the outlet control structure. The final documentation will be provided to the District in electronic format. Barr assumes that one draft memorandum will be provided, and that RPBCWD staff, and project stakeholders complete concurrent reviews of the draft memorandum. A final technical memorandum will be prepared following receipt of comments from all reviewers.

### **Task 5. Presentation of results**

Barr will attend one Board meeting to present findings. It is assumed that Barr will prepare a 5-minute presentation summarizing the findings and respond to comments and questions during the Board meeting. We assume the Board meeting will be 2-hours and be virtual or held at the RPBCWD office. It is assumed that District staff will update the Citizen Advisory Committee (CAC), and Barr staff will not attend CAC meetings.

#### **4. Deliverables:**

Deliverables for this Task Order will include:

##### **Task 1. Evaluate Duck Lake Outlet Configurations**

- Stage-duration curve for the 1979-2014 outlet assuming free of debris.
- Stage-duration curve for the 1979-2014 outlet approximating partial plugging of the outlet.
- Stage-duration curve for a modified outlet that approximates the performance of the 1979-2014 outlet assuming the outlet is free of debris.
- Stage-duration curve for a modified outlet that approximates the performance of the 1979-2014 outlet approximating partial plugging of the outlet.

##### **Task 2. Stakeholder Coordination**

- Meeting invitation, agenda, and notes for one working meeting.

**Task 3. Concept Development**

- Conceptual figure(s) for outlet structure modifications. Concept figure(s) may include:
  - One cross section of the outlet structure.
  - One plan view of the outlet structure.

**Task 4. Documentation**

- Draft technical memorandum summarizing the stormwater simulations, stakeholder coordination, and concept plans.
- Final technical memorandum that addresses comments from RPBCWD, city, and DNR staff.

**Task 5. Presentation of Results**

- Attendance at RPBCWD Board meeting to present findings summarized in Task 4 technical memorandum.

5. Budget:

Services under this Task Order will be compensated for in accordance with the engineering services agreement and will not exceed \$16,500, without written authorization by the Administrator. Table 1 provides a breakdown of the anticipated cost for major tasks associated with scope of services describe above.

Table 1. Anticipated Task Order Budget and Completion Dates

Task	Description	Anticipated Budget	Anticipated Completion Date
<b>Task 1. Evaluate Duck Lake Outlet Configurations</b>		\$6,800	April 2024
<b>Task 2. Stakeholder Coordination</b>		\$1,500	April/May 2024
<b>Task 3. Concept Development</b>		\$3,300	May 2024
<b>Task 4. Documentation</b>		\$3,300	May/June 2024
<b>Task 5. Presentation of Results</b>		\$1,600	June 2024
	<b>Task Order 46 Total</b>	<b>\$16,500</b>	

6. Schedule and Assumptions Upon which Schedule is based.

The Engineer shall complete the tasks listed above by July of 2024 assuming authorization to proceed is provided at the February 2024 Board meeting. The proposed schedule is based on the following assumptions:

- a) The Duck Lake outlet structure was modified sometime between 1979 and 2011. It is unclear when the outlet was modified. This evaluation will assume that the outlet structure was modified in 1979.
- b) Only one land use (current conditions) will be used for the model simulations. While not anticipated at this time, other land use scenarios may need to be simulated (1969, 1979, or predevelopment) to support “what if” scenarios.
- c) No more than two concepts for outlet modifications will be evaluated. Alternative outlet configurations would be simulated on a time and materials basis.
- d) Concept-level figures will be prepared to facilitate stakeholder discussions. Final design services for a modified outlet are not included and would be provided on a time and expense basis.
- e) Opinions of probable cost will not be prepared.

- f) MSP airport rainfall data will be used for the long-term continuous simulations through 2021, which was the precipitation record summarized in the Barr 2021 memorandum. Precipitation record will not be extended to include more recent MSP data.
- g) All lake level data that will be used for model calibration and validation is available. No new lake level data will be considered as part of the evaluation.
- h) Simulations will be done in PCSWMM using a clipped portion of the District stormwater model last updated for Task Order 35.
- i) The overall larger Purgatory Creek model will not need to be used to complete any simulations.
- j) No field verification will be completed.
- k) No property owner coordination, including discussions with the railroad or Duck Lake Association regarding outlet modifications or changes to the 100-year peak water surface elevation will be completed as part of this task order.
- l) Comments on the draft technical memorandum will be provided by RPBCWD staff and project stakeholders within 2 weeks of receipt of the draft memorandum.

**IN WITNESS WHEREOF**, intending to be legally bound, the parties hereto execute and deliver this Agreement.

**CONSULTANT**

**RILEY PURGATORY BLUFF CREEK  
WATERSHED DISTRICT**

By \_\_\_\_\_

By \_\_\_\_\_

Its Vice President

Its \_\_\_\_\_

Date:

Date:

*APPROVED AS TO FORM & EXECUTION*

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