Minnehaha Creek Watershed District *REQUEST FOR BOARD ACTION*

MEETING DATE: August 11, 2016

TITLE: Authorization to Enter into Contract with Wenck Associates to Conduct Wetland Surveys and Soils Analysis

RESOLUTION NUMBER: 16-xxx

PREPARED BY: Yvette Christianson, Water Quality Manager
ychristianson@minnehahacreek.org **TELEPHONE:** 952-641-4514

REVIEWED BY: ☐ Administrator ☐ Counsel ☒ Program Mgr. (Name): Craig Dawson
☐ Board Committee ☐ Engineer ☐ Other

WORKSHOP ACTION:

☐ Advance to Board mtg. Consent Agenda.	☐ Advance to Board meeting for discussion prior to action.
☐ Refer to a future workshop (date):_____	☐ Refer to taskforce or committee (date):_____
☐ Return to staff for additional work.	☐ No further action requested.
☒ Other (specify): Recommend Approval	

PURPOSE or ACTION REQUESTED:
Authorization to execute contract with Wenck Associates to Conduct Wetland Surveys and Soils Analysis for the E-Grade Program. The total cost of the wetland vegetation surveys and soils analysis is not to exceed $15,000

PROJECT/PROGRAM LOCATION:
Ten wetlands within upper Minnehaha Creek subwatershed

PROJECT TIMELINE:
The wetland surveys and soil analysis will be conducted from August through September 2016

PROJECT/PROGRAM COST:
Fund name and number: Research and Monitoring Department: Water Quality Program (500-5001-4320)
2016 budget: $57,950
Requested amount of funding: $15,000
Is a budget amendment requested? No
Is additional staff requested? No

PAST BOARD ACTIONS:
None

SUMMARY:

The E-Grade program is being developed to promote greater understanding of the overall health of the waterbodies as well as the watershed itself. Under this program, waterbodies and other ecological features (e.g.; wetlands) will be evaluated for their performance of ecosystem functions.

For wetlands, in particular the ecosystem function of nutrient cycling, there are four components the E-Grade Program plans to assess: vegetation, land use, connectivity to other waterbodies, and soils. Wetland soils assess a wetland's ability to cycle phosphorus and improve water quality; however, samples can be expensive to analyze.

Ten wetland surveys in the upper Minnehaha Creek subwatershed will be conducted under the MPCA RFQA methodology. The RFQA is a timed meander survey that identifies vegetation species based on number of communities and diversity of vegetation present.

In upper Minnehaha Creek subwatershed, there is little to no wetland soils data. In order to fulfill this component, these 10 wetlands will also have soils samples collected by Wenck Associates. Two sediment cores will be collected at each site and analyzed following the Environmental Protection Agency's National Wetland Condition Assessment protocol. The sediment cores will be analyzed by two laboratories that Wenck Associates has contracted with: University of Wisconsin-Stout and University of Minnesota Soils Testing Laboratory. The laboratory at University of Wisconsin-Stout will extract the iron, aluminum, manganese, phosphorus fractions from the soil cores, then the University of Minnesota Soils Testing Laboratory will analyze the extractions. The cores will be analyzed to measure a wetland's ability to adsorb and release phosphorus.

The Research and Monitoring Department's Water Quality Program 2016 budget approved by the Board has available funds under "contracted services" to support the wetland surveys and soils analysis. The wetland vegetation surveys and soil analysis is not to exceed $15,000 (Attachment 1).

RESOLUTION

RESOLUTION NUMBER: 16-xxx

TITLE: Authorization to Enter into Contract with Wenck Associates to Conduct Wetland Surveys and Soil Analysis

WHEREAS, As part of the E-Grade Program, evaluation of Minnehaha Creek Watershed District wetlands was identified to be performed to assess the function of nutrient cycling; and

WHEREAS, For the development of E-Grade, approximately 10 wetlands will be sampled throughout upper Minnehaha Creek subwatershed; and

WHEREAS, Wetland survey in the upper Minnehaha Creek subwatershed will be conducted under the MPCA RFQA methodology; and

WHEREAS, Sediment cores will be taken at each site and analyzed to determine the wetland's soils ability to cycle phosphorus; and

WHEREAS, Wenck provides a unique mix of limnologists, ecologists, wetland ecologists, and engineers with an extensive background in watershed management to develop the ecosystem watershed evaluation; and

WHEREAS, Wenck Associates has unique knowledge of the hydrologic and hydraulic behavior of the Minnehaha Creek watershed and the organizational goals of the MCWD, as well as its work to date in developing the concept of the ecosystem evaluation program, which together make Wenck Associates uniquely qualified; and

WHEREAS, MCWD's Research and Monitoring staff recommends the approval of entering into a contract with Wenck Associates to conduct wetland surveys and soils analysis on selected wetlands in upper Minnehaha Creek subwatershed; and

NOW, THEREFORE, BE IT RESOLVED, that the Minnehaha Creek Watershed District Board of Managers; hereby authorizes the District Administrator to execute a contract with Wenck Associates to conduct wetland surveys and soils analysis that is not to exceed $15,000.

Resolution Number 16-XXX was moved by Manager _____ seconded by Manager _____
Motion to adopt the resolution ___ ayes, ___ nays, ___abstentions. Date: _____.

_____ Date:_____
Secretary

Proposal

WENCK ASSOCIATES

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Exceptional outcomes.

To: Yvette Christianson, Water Quality Manager, Minnehaha Creek Watershed District

From: Wes Boll, Wenck Associates, Inc.

Date: August 2, 2016

Subject: Proposal for Upper Minnehaha Creek Subwatershed Wetland Monitoring

This proposal is for work associated with monitoring of selected wetlands in the Upper Minnehaha Creek subwatershed. Specifically, this proposal provides a proposed scope of services and cost estimate to conduct an assessment of vegetation communities following the MPCA Rapid Floristic Quality Assessment (RFQA) methodology and to collect soil samples within the wetland for laboratory analysis. The scope of work will also include coordination with MCWD staff to select wetlands to be included in the monitoring, and compilation of the collected data.

SCOPE OF SERVICES
Conduct RFQA survey and soil sampling in approximately 10 wetlands

TASK 1: SELECTION OF MONITORED WETLANDS
Using the boundaries of wetlands identified by the MCWD Functional Assessment of Wetlands (FAW), Wenck proposes to coordinate with MCWD staff to select wetlands to survey within the Upper Minnehaha Creek subwatershed. Attempts will be made during the selection of potential wetlands to get a distribution of wetland types and sizes of monitored wetlands. Priority will also be given to wetlands that are proposed near or within potential improvement projects or wetlands where past improvement projects have occurred.

As part of this task, Wenck will also generate field maps of each selected wetland to be used during the field monitoring visits.

TASK 2: RFQA SURVEY
Wenck proposes to conduct surveys of wetland vegetation communities following the methodology for conducting RFQA surveys defined in the *Rapid Floristic Quality Assessment Manual* (MPCA, 2014). The RFQA is a vegetation based ecological condition assessment approach based on numerical ratings of a plant species tolerance of disturbance and specific habitat requirements. The RFQA uses a timed meander survey of vegetation species with a survey time based on the number of vegetation communities and vegetation diversity present. Field teams consisting of 2 Wenck staff will conduct a site visit to each wetland to document vegetation communities in order to determine the quality of each vegetation community present in the wetland. Each vegetation species will be assigned a cover class and information will be recorded on the appropriate data form at each wetland. Other information collected will include photographs and a sketch of wetland vegetation community boundaries (as defined by the Eggers and Reed classification system).

Yvette Christianson
Water Quality Manager
Minnehaha Creek Watershed District
August 3, 2016

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TASK 3: SOIL SAMPLING
Wenck proposes to collect samples from soil cores within the monitored wetlands. The primary objectives of the proposed soil sampling are to assess wetland soil's capacity adsorb phosphorus and to assess the possibility for sediment phosphorus release during periods of anoxia. The proposed methodology for soil sampling and analysis are described in further detail in Attachment 1.

Generally, two areas will be selected for sampling in each wetland, continuously inundated areas (open water) and seasonally inundated areas. The goal of sampling these two areas in the wetland is to assess geochemistry in areas that continually are interacting with surface water (i.e. continuously inundated areas) to assess possible phosphorus release during anoxic periods and assess phosphorus adsorption capacity in areas that experience intermittent flushing (i.e. seasonally inundated areas). One sample will be collected in each area for a total of 2 samples in each selected wetland. Samples will be submitted to laboratories for analysis for selected parameters.

TASK 4: COMPILE DATA
Following the completion of RFQA surveys, Wenck will enter the field data into the appropriate database to assess the quality of each vegetation community and monitored wetland. The results will be summarized in a database and GIS shapefile. Wenck will also compile the soil analysis data after it is received from the laboratory.

Table 1. Cost Estimate

Scope of Work	Fee Estimate
Task 1: Selection of Monitored Wetlands	$1,500
Task 2: RFQA Surveys	$5,000
Task 3: Soil Sampling	$7,000
Task 4: Compile Data	$1,500
TOTAL =	**$15,000**

Each task includes the expected minimum level of effort using the most efficient discounted hourly rates that are currently used by MCWD along with direct expenses covering mileage, survey equipment, etc. It is anticipated surveys would begin within two weeks of MCWD authorization.

Wenck appreciates the opportunity to provide you with our proposal. If you have any questions or comments regarding this proposal, please call me at (763)479-4283.

Yvette Christianson
Water Quality Manager
Minnehaha Creek Watershed District
August 3, 2016

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If this proposal is acceptable, please sign and return.

Sincerely,

WENCK ASSOCIATES, INC.

Wes Boll

ACCEPTED BY:

Minnehaha Creek Watershed District

Yvette Christianson, Water Quality Manager
Minnehaha Creek Watershed District

(Date)

Attachment 1

Technical Memo

WENCK ASSOCIATES

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To: Kelly Dooley, Minnehaha Creek Watershed District
Yvette Christianson, Minnehaha Creek Watershed District

From: Brian Beck, Wenck Associates, Inc.
Joe Bischoff, Wenck Associates, Inc.

Copy: Wes Boll, Wenck Associates

Date: 9/22/2015

Subject: E-Grade Wetland Soil Sampling Methodology and Parameters

Objectives

The primary objectives of soil sampling are to assess wetland soil's capacity adsorb phosphorus and to assess the possibility for sediment phosphorus release during periods of anoxia. These objectives can be answered using well-established analytical techniques used to describe phosphorus cycling in wetlands and lakes. The results from the sampling will not only be used to compare among wetlands within the Minnehaha Creek watershed, but other studies which have used similar methods to assess phosphorus cycling in wetlands. Ultimately, the results from this sampling effort will help assess wetlands net positive or negative impacts on water quality.

Site Selection

Generally, two areas will be selected for sampling in each wetland, continuously inundated areas (open water) and seasonally inundated areas. The goal of sampling these two areas in the wetland is to assess geochemistry in areas that continually are interacting with surface water (i.e. continuously inundated areas) to assess possible phosphorus release during anoxic periods and assess phosphorus adsorption capacity in areas that experience intermittent flushing (i.e. seasonally inundated areas). One sample will be collected in each area.

Although spatial variability does exist within wetlands, the goal of this study is not to characterize the heterogeneity of any particular wetland. The goal of this study is to assess how the geochemistry among a variety of wetlands may impact water quality conditions. For this reason, only one sample will be collected from seasonally and permanently inundated areas.

Sampling Methods

The NWCA and other publications (Reddy, 2008) provide a variety of soil sampling methodologies. For example, the NWCA recommends that samples be collected every 8 cm from 0 to 60 cm, while Reddy et. al. (2008) generically recommends that soil sections of 5, 10, or 15 cm be collected. When sampling soils and sediments, the top 10 cm is generally accepted as the section of sediment that interacts with the overlying water column. My recommendation is to consistently sample the top 10 cm of sediment at each site.

Although the top 10 cm should be consistently sampled, the tools used to collect samples may vary among wetlands. Since each wetland will have different saturation, density, and consistency conditions, it may not be possible to sample each wetland using the same tool. For example, a wetland with very loosely consolidated sediment may need to be sampled with a sediment corer while other types of wetlands may need to be sampled with a shovel or soil auger. Equipment selection will be left to professional judgement of the scientist conducting the soil sampling.

The NWCA field manual recommends that surface vegetation be removed prior to sediment sampling. This is recommended for the E-grade sampling program since it would be difficult to collect soil samples that include overlying vegetation cover.

Parameters Analyzed

Literature sources were reviewed to determine if there are common soil chemistry parameters that could be used for the E-grade wetland monitoring program. One program that has investigated soil chemistry in the past is the EPA's NWCA. Table 1 contains the entire list of soil parameters that were routinely measured for the NWCA program.

Table 1. Soil parameters that were measured for the NWCA program.

Method	SSL Method	Analyte
PSDA, <2mm, air dry	3A1a1a	Clay, Silt, Sand
Calcium carbonate equivalent, <2mm	4E1a1a1a1	CaCO3
Calcium carbonate equivalent, <20mm	4E1a1a1a2	CaCO3
Total Carbon, Nitrogen and Sulfur	4H2a1-3	C, N, S
pH	4C1a2a1a-b1, 4C1a2a2a-b1	1:1 H20, 1:2 0.01 M CaCl2
Cation exchange capacity	4B1a1b1-4	CEC, $Ca2^{+}$, K^{+}, Mg^{2-}, Na^{+}
Ammonium Oxalate Extraction	4G2a1a1-5	Al, Fe, Mn, P, Si
Electrical Conductivity	4F1a1a1a1	EC
Dithionite-Citrate Extraction	4G1a1-3a-b1	Al, Fe, Mn
Olsen Phosphorus	4D5a1a-b1	P
Mehlich Phosphorus	4D6a1a-b1	P
Trace Elements	4H1a1a1a1-20	Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Mn, Mo, Ni, P, Pb, Sb, Se, Sn, Sr, VW, Zn
Bulk Density	3B1a3B1b, 3B1c3B1d	Db_{fi}, Db_{od}, Db_{33}

Of these parameters, the ammonium oxalate extraction and analysis appears to be a widely used method for measuring aluminum and iron in wetland sediments (Reddy, 1995; Richardson, 1985). Furthermore, the ammonium oxalate extractable metals method has been used to investigate wetland's phosphorus sorption capacity (Reddy, 1995), which may be a useful metric to assess a wetland's ability to improve water quality. For these reasons, the ammonium oxalate iron, aluminum, and phosphorus extraction method will be used to analyze each wetlands ability to act as a sink for soluble phosphorus.

In addition to phosphorus sorption, anoxic release of phosphorus will be taken into consideration using Psenner and Puckso (1988) method. This method will allow us to determine the amount of redox sensitive phosphorus that is available during anoxic periods.

Parameter Costs

The ammonium oxalate metal and phosphorus extraction method would be conducted by the University of Wisconsin Stout, while the analysis of the extract would be performed by the University of Minnesota Soil testing lab. Costs for each lab is listed in Table 2.

The phosphorus fractionation extractions and analysis will both be performed by the University of Wisconsin Stout (Table 3).

Table 2. Ammonium oxalate extraction and analysis costs.

Analysis Step	Laboratory	Cost	Unit
Extraction	UW Stout	$10.00	per site
Shipping to U of M	N/A	$20.00	per batch
Equipment Setup	U of M Soils	$108.00	per batch
Mn, Fe, Al, and P Analysis	U of M Soils	$57.50	per site
Per Sample Cost		$67.50	Total
Per Batch Cost		$128.00	Total

Table 3. Phosphorus fractionation of iron bound, labile organic, and loosely bound phosphorus.

Analysis Step	Laboratory	Cost	Unit
Psenner Extraction and analysis	UW Stout	$100.00	per site
Per Sample Cost		$100.00	Total

Table 4. Total costs per wetland for soil analytical methods

Analysis	Sites Sampled	Cost	Samples Per Wetland	Total Cost Per wetland
Psenner Extraction	Continuously Inundated areas	$100 per sample	1	$100
Ammonium Oxalate Extraction	Seasonally and continuously inundated areas	$67.50 per sample	2	$135
.Per Wetland Cost				$235[1]

[1] Per batch costs were not taken into account since they will be relatively small.

References

Reddy, K.R., O.A. Diaz, L.J. Scinto, and Agami. 1995. Phosphorus dynamics in selected wetlands and streams of the Lake Okeechobee Basin. Ecol. Eng. 5:183-208.

Reddy, K.R., DeLaune, R.D. 2008. Biogeochemistry of Wetlands: Science and Applications.