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WATER POLLUTION CONTROL

MEMORANDUM

To: Gregg Mandsager, City Administrator

CC: Nancy Lueck, Finance Director
Fran Donelson, Secretary

From: Jon Koch, WPCP Director

Date: June 13, 2016

Re: Mandated Wastewater Treatment Nutrient Study Approval Request

INTRODUCTION: City staff requests the approval of a Nutrient Reduction Study for the Water Pollution Control Plant (WPCP) as required by the new city discharge permit issued by the Iowa Department of Natural Resources (IDNR). Stanley Consultants has submitted a Professional Services Agreement (PSA) for this project in the amount of \$74,900.00. \$75,000 was budgeted for this mandated study.

BACKGROUND: The City WPCP received a new discharge permit from the IDNR in January 2015. In support of the Iowa Nutrient Reduction Strategy, this permit requires a report that evaluates the feasibility and reasonableness of reducing the amounts of nitrogen and phosphorus discharged into the Mississippi River through the plant final effluent. The report is due January 1, 2017, and requires a report on current conditions as well as an extensive engineering study of available technologies to reduce these pollutants to below 10 mg/L of nitrogen and 1 mg/L of phosphorus. Through negotiations with the IDNR, a schedule will be made to achieve reductions laid out in the study.

RECOMMENDATION/RATIONALE: Staff recommends approval of the Wastewater Treatment Nutrient Study PSA with Stanley Consultants, Inc in the amount of \$74,900.00

BACKGROUND:

1. PSA:

PROFESSIONAL SERVICES AGREEMENT

Muscatine WWTP Nutrient Study
SC2272 1299

THIS IS AN AGREEMENT made as of June 16, 2016, between CITY OF MUSCATINE, IOWA (CLIENT) and STANLEY CONSULTANTS, INC. (CONSULTANT). CLIENT intends to have CONSULTANT perform a Wastewater Treatment Nutrient Study (hereinafter called "project"). CLIENT and CONSULTANT agree:

1. **Scope of Services.** CONSULTANT shall perform professional services as stated in Exhibit 1.
2. **Compensation.** CLIENT shall compensate CONSULTANT for CONSULTANT's services as stated in Exhibit 2.
3. **Terms and Conditions.** CONSULTANT shall provide professional services in accordance with the terms and conditions stated in Exhibit 3. If client issues a purchase order or other document to initiate the commencement of services hereunder, it is agreed that any terms and conditions appearing thereon shall have no application and only the provisions of this Agreement shall automatically apply.
4. **Special Provisions.** Special provisions to this Agreement, if any, are stated in Exhibit 4.
5. CLIENT has provided or shall provide for payment from one or more lawful sources of all sums to be paid to CONSULTANT.
6. Following exhibits are attached to and made part of this Agreement:
Exhibit 1 - Scope of Services
Exhibit 2 - Compensation
Exhibit 3 - Standard Terms and Conditions
Exhibit 4 - Special Provisions

Background

The City of Muscatine is required by the Iowa Department of Natural Resources (IDNR) through the City's recently renewed NPDES permit to study nutrient reduction at its wastewater treatment plant and submit a nutrient reduction plan by January 1, 2017 with the following components:

- A description of the existing treatment facility with particular emphasis on its capabilities for removing nutrients (total nitrogen and total phosphorus) and existing nutrient loadings and removals.
- Operational changes to the existing treatment facility that could be implemented to reduce the amounts of total nitrogen and total phosphorus discharged in the final effluent shall be described and evaluated. The feasibility and reasonableness of each change including anticipated nutrient reductions, cost, and impact on overall treatment performance shall be estimated.
- New or additional treatment technologies that would achieve significant reduction in the amounts of nutrients discharged in the final effluent consistent with the Iowa Nutrient Reduction Policy (10 mg/L of total nitrogen and 1 mg/L of total phosphorus or 66% reduction of total nitrogen and 75% reduction of total phosphorus for plants impacted by industrial loadings shall be described and evaluated. The evaluation shall include the feasibility, reasonableness, practicability, the availability of equipment, capital costs, annual operating costs, impact on user rates and any non-water quality environmental impacts (e.g. additional air pollution, increases sludge production, etc.) for each alternative.
- Based on the evaluations of operational changes and new or additional treatment technologies the report must select the preferred method(s) for reducing total nitrogen and total phosphorus in the final effluent, the rationale for the selected method(s) and an estimate of the effluent quality achievable.

- The report must include a schedule for making operational changes and/or installing new or additional technologies to achieve the projected effluent quality attainable using the selected method(s).

This scope of services has been developed to assist the City of Muscatine in analyzing plant performance

for nutrient reduction, evaluate treatment technologies that may need to be added to increase nutrient

reduction, prepare a nutrient reduction strategy report to the IDNR outlining recommendations and schedule,

and assist the City in communication with the IDNR.

Basic Services

1. Initial Project Meeting – Conduct an initial project meeting with Client to:

- a. Review scope and activities, schedule,
- b. Discuss expectations, and communication procedures,
- c. Review and discuss Client's existing sampling plan and locations and available data. Discuss possible supplemental sampling locations and parameters for process insight.
- d. Discuss process operations and performance.
- e. Prepare meeting notes and distribute electronically.

2. Existing Plant Review

- a. Review existing plant physical data.
- b. Review existing plant influent and effluent flow and loading data provided by Client in electronic file – excel spreadsheet format.
- c. Evaluate overall plant performance with respect to BOD, TSS, NH₃N, TP, and TN pollutants.
- d. Prepare a technical memorandum summarizing the plant performance with respect to these pollutants. Technical memorandum, Existing Plant Nutrient Removal Performance, will be distributed electronically.

3. Wastewater Characterization Study

- a. Prepare Wastewater Characterization Plan for Client to use in obtaining additional samples and conducting or arranging for additional analytical tests as may be necessary for the study. Wastewater Characterization Plan will be distributed electronically.
- b. Review wastewater characterization results.

4. Create a calibrated steady state treatment process model of existing process conditions with roughing filter in service. Process model will utilize BioWin software. Confirm existing treatment process sizing, loadings, and criteria.

5. Operational Adjustments Evaluation

- a. Utilize process model to evaluate the following operational adjustments:
 - i. Changing activated sludge SRT.
 - ii. Changing activated sludge return rates.
 - iii. Changing dissolved oxygen levels in activated sludge system.
 - iv. Impact of removing or partially removing roughing filter from treatment train.
- b. Estimate potential performance of simultaneous nitrification denitrification achieved by cycling air on and off in a portion of the aeration basin.

6. Evaluate the following nitrogen reduction processes and necessary improvements:

- a. Addition of anoxic zone in front of the aeration basins to promote total nitrogen reduction with no mixed liquor return with chemical phosphorus removal.
- b. MLE process (anoxic zone at front of aeration basins with mixed liquor return) with chemical phosphorus removal.

7. Evaluate the following phosphorus reduction processes and necessary improvements:

- a. A/O process consisting of anaerobic zone at front portion of the aeration basins.
- b. A₂/O process consisting of anaerobic zone in front of anoxic zone at front portion of the aeration basins with mixed liquor return to the anoxic zone to remove both nitrogen and phosphorus.
- c. Chemical phosphorus removal.

d. Evaluate filtration technologies including disc, membrane, and ceramic and possible benefits and costs for phosphorus removal.

8. Meet up to three times with Client to discuss progress and concept development.

9. Nutrient Reduction Feasibility and Implementation Plan

a. Prepare written report summarizing existing treatment, historic performance, operational alternatives and anticipated performance, process modifications and anticipated performance, and overall cost analysis results and proposed implementation plan.

b. Prepare cost analysis of the different alternatives.

c. Prepare three copies of draft Nutrient Reduction Study Report and Implementation Plan for Client's consideration.

d. Meet with Client to review the draft Nutrient Reduction Study Report and Implementation Plan.

e. Finalize Nutrient Reduction Study Report and Implementation Plan and submit to IDNR. Provide three copies of final plan to Client and three copies to Iowa DNR.

10. IDNR Assistance

a. Coordinate initial teleconference with IDNR to discuss permit requirements and technical approach. Prepare meeting notes and distribute electronically.

b. Discuss IDNR review comments in teleconference with IDNR.

11. Summary of Meetings and Deliverables

a. Meetings

i. Project Kickoff Meeting

ii. Progress Meetings (3)

iii. IDNR Teleconferences (2)

iv. Draft Nutrient Reduction Study and Plan Review Meeting

b. Deliverables

i. TM – Existing Plant Nutrient Removal Performance (electronic)

ii. Wastewater Characterization Sampling and Analysis Plan (electronic)

iii. Draft Nutrient Reduction Feasibility and Implementation Plan (3 copies)

iv. Final Nutrient Reduction Feasibility and Implementation Plan (6 copies)

Compensation for Basic Services:

Client shall compensate Consultant a Lump Sum amount of Seventy-Four Thousand Nine Hundred

Dollars (\$74,900) for Basic Services described in Exhibit 1 – Scope of Services.