TM WADE TRIM

MEMORANDUM

To: Michigan Department of Environmental Quality (MDEQ)
Revolving Loan Section, Attn: Mr. Jonathan Berman

From: Wade Trim

CC: Oakland County Water Resources Commissioner, George W. Kuhn Drainage District

Date: 10/31/2017

Re: George W. Kuhn Drainage District
MDEQ Stormwater, Asset Management and Wastewater (SAW) Grant #1223-01
Summary of Wastewater Asset Management Plan

The following is a summary of the work completed under the MDEQ SAW Grant work performed by the George W. Kuhn Drainage District. It includes a summary of the project scope, results and findings of activities covered by the grant, grant amount spent and match amount, and contact information. It has been prepared as required under Section 603 of Public Act 84 of 2015, and follows recent MDEQ guidance.

GRANTEE INFORMATION

George W. Kuhn Drainage District, SAW Grant Project #1223-01

Project Grant Amount: $1,392,917

Applicant Match Amount $242,083

Total Project Amount $1,635,000

Primary Contact
Mr. Jim Nash
Oakland County Water
Resources Commissioner
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248.858.0958

Consultant Contact
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EXECUTIVE SUMMARY

The George W. Kuhn Drainage District applied for and received a grant to further develop an Asset Management Plan (AMP) for its sanitary and combined systems through the Michigan Department of Environmental Quality's (MDEQ) Stormwater, Wastewater and Asset Management (SAW) program. Because the SAW program was funded through monies appropriated for water quality, other related infrastructure systems, such as drinking water, were not eligible for funding through the grant, but are considered in analysis and recommendations where appropriate.

The George W. Kuhn Drainage District is owned by the Oakland County Water Resources Commissioner (under jurisdiction of Chapter 20 of the Drain Code) and is operated and maintained by the Oakland County Water Resources Commissioner (WRC.) The WRC has various tools used to manage the assets it owns or operates and maintains, including a GIS geodatabase, collaborative asset management system, hydraulic models, condition assessment methods, risk and prioritization models, capacity studies, asset deterioration models, and an operating and capital improvement project prioritization model. These tools are used to guide the short and long-term strategies for WRC to operate the various systems in a sustainable manner that meets the required level of service, with a focus on prioritizing assets that are most critical and being cost-effective.

The WRC "Common to All" approach was generally followed with in development of the asset management plan for this system. The following is a summary of the AMP, as required by the grant, which includes a brief discussion of the five major AMP components, a list of the plan's major identified assets, and contact information for the grant.

WASTEWATER AND/OR STORMWATER INVENTORY

WRC uses its existing Geographic Information System (GIS) geodatabase as the primary means to inventory and map the assets in the system. The geodatabase includes key attributes associated with each asset, such as installation date (age), size, material, along with other information as needed for a given asset type.

WRC currently uses the Cityworks software package for its Computer Maintenance Management System (CMMS,) which then collaborates with the GIS to present a single interface to the user via the Collaborative Asset Management System (CAMS.) CAMS assist in managing inspections and maintenance work by generating and tracking work orders, collecting inspection and condition data, and compiling costs and hours spent on each asset. Maintenance history and costs can be tracked on an asset and/or fund level.

Condition assessment tools and protocols were developed by WRC to allow for efficient and consistent recording of asset condition. For sanitary and combined sewer assets, a NASSCO-compliant software program stores data collected during sewer televising. The data stored can be shared with the existing CAMS system. Inspection work orders in the CAMS system are used for evaluation of other types of assets, such as manholes and other collection system structures, and for most vertical asset types, such as pumps, valves, structures, etc.

As part of the grant for George W. Kuhn Drainage District, the GIS geodatabase inventory was reviewed for completeness and to ensure critical attributes were populated. Approximately 170,000 lineal feet of combined sewer underwent condition assessment via cleaning and televising. Approximately 1,584 manholes and other related structures were evaluated using the CAMS inspection work orders. Vertical assets, including a retention treatment basin, pump stations, regulators, chambers and flow and level

sensors, were inventoried using a WRC hierarchy template and condition assessment data was collected and input into the CAMS system.

CRITICALITY OF ASSETS

Baseline Probability of Failure (POF) and Consequence of Failure (COF) factors that WRC configured into the Power Plan software as part of the "Common to All" approach was used to estimate the overall risk of the horizontal assets (sewers and associated structures.) For pump stations and storage and treatment facilities, individual assets were reviewed by staff as part of the grant work, and POF and COF factors determined and input into the software.

The assets that have the greatest POF and the greatest COF will be the assets that are the most critical. Both the POF and COF were scored on a scale of 1 to 5, with 1 being the lowest probability or consequence of failure, and 5 corresponding to the highest probability or consequence of failure. The Business Risk Evaluation (BRE or Risk) score is the product of the POF score and the COF score (POF times COF equals Risk,) and has a scale of 1 to 25.

The POF and COF for horizontal assets are determined using scoring values developed uniquely for each asset type, such as gravity main, non-gravity main, manhole, etc. The POF and COF scores for each asset type are calculated using attribute data from the GIS geodatabase, inspection data from the CAMS system, and NASSCO PACP and MACP ratings. The primary attribute for determining the POF of gravity mains (sanitary and storm sewers) was the PACP Structural Quick Score. The PACP Maintenance Quick Score and age are also incorporated into the POF rating. Where PACP scores were not available, the POF score was based on the age-based assumed condition.

For force mains, the POF was based on age, normal operating pressure, quantity of repairs tracked in the CMMS, and velocity. For manholes and other access structures, the POF is based primarily on the MACP fields cover condition, frame condition, chimney condition, cone condition, wall condition, bench condition, and channel condition along with age. If the MACP data was not available, the score was based on just age.

The COF for mains and access points (storm and sanitary sewers, force mains, siphons and related structures) was determined based on asset depth, size, proximity to groundwater and flood zones, and proximity to roads and intersections.

The POF and COF of vertical assets were calculated using a scoring matrix. The POF for vertical assets was calculated using a combination of age and physical condition collected from inspections performed using work orders through the CAMS system. O&M protocol and performance factors were also scored and used in the calculation. In the absences of any other data, age was used to estimate POF.

The COF for vertical assets was scored using a matrix of factors including: safety of public and employees, financial impact, public confidence, regulatory compliance, and firm capacity.

LEVEL OF SERVICE DETERMINATION

At the strategic level, the Level of Service (LOS) identifies the long-term goals and strategies of the organization. An overall LOS guiding matrix was developed to document the goals and strategies of the WRC organization. The WRC Mission Statement and the annual Long-Range Plan (LRP) process form additional elements of the LOS.

The WRC Base Level of Service Goals included:

- Financial Viability and Impact. Goal: Emergency repairs can be repaired within Utility Reserve Budgets of the system. Measurable: Exceedances of reserve budgets
- Public Confidence and System Service Impact. Goal: Minimal to some loss of service or impact on other services for less than four hours. No sewer system or basement backups. Minor disruption (e.g., traffic, dust, noise.) Measurable: Number of service interruptions, complaints, and backups.
- Regulatory Compliance. Goal: No state permit violations and comply with all MDEQ policies. Measurable: Number of violations
- Safety of Public and Employees. Goal: Non-reportable injuries, no lost-time injuries or medical attention required. No impact to public health. Measurable: Number of injuries and any public health advisories.
- Redundancy. Goal: Comply with 10 State Standards. Measurable: Number of violations.
- Risk and BRE score: Goal: 70% of assets have a BRE less than 15. Measurable: System risk score.
- Staffing. Goal: Staffing levels and training maintained to meet level of service. Measurable: Number of open positions, training hours.

At the tactical level, the LOS focuses on the prioritization in the medium-term and identification of factors and indicators related to performance, cost, risk, and failure probability. The Probability of Failure and Consequence of Failure scoring matrices used in the criticality and risk analysis were developed using the strategic LOS guidance. Progress toward the goals are measured through the CAMS analytic data, and is reviewed as part of the LRP process with internal staff and customers.

At the operational level, the LOS is related to procedures and information related to the short-term, day-to-day operation. Performance is measured at the asset level using work orders to collect data, and annual reporting of measurables and progress toward goals with operational staff.

The existing computer model representations of the collection system, storage and treatment facility and regulator system have been expanded and calibrated. These models will provide WRC with the tools that can be used to evaluate the performance of the current system, identify bottlenecks in the system, test changes to the operational protocol, and evaluate the impact to the system. A computational fluid dynamic (CFD) model of the sodium hypochlorite mixing system within the GWK RTB has been created. This model is being used to evaluate the effectiveness of the mixing system. The system was evaluated for low flow conditions using the diffuser system and for high flow conditions using the induction mixers. Alternatives are currently being evaluated to change the alignment of the mixers to improve the mixing efficiency.

REVENUE STRUCTURE

The annual operation and maintenance budget includes the typical costs spent each year to operate the system and to perform normal maintenance activities. This baseline O&M budget does not include major capital improvements that are required to increase capacity, meet new regulatory requirements, or replace items that have failed or reached the end of their useful service life.

The asset optimization software assisted WRC staff by developing recommended strategies for inspections, rehabilitation and replacement needs over the long-term for each system based on condition and risk. WRC project management staff then reviewed the recommendations generated by the software and rationalized the recommendations to “real world” needs, including any improvements

required due to capacity or regulation changes. The WRC uses this information as part of its existing "Long Range Plan" (LRP) process.

The LRP rate methodology is a tool to determine utility rates and charges to provide sufficient revenues to cover the anticipated operation, maintenance, replacement, capital improvement projects, and debt costs associated with a given system, as well as to maintain a reserve balance for emergencies or a significant one-time charge. It ensures adequate revenues are collected for budgeted needs in the current year, and over the long term.

The LRP includes multiple reserve accounts that are used to fund activities above and beyond the normal annual operation and maintenance costs. The reserve accounts include:

- Emergency Repair Reserve for unexpected repairs due to system failure or catastrophic events.
- Capital Improvement Plan (CIP) Reserve for replacement of equipment or facilities in kind or with alternate technology.
- Major Maintenance Reserve which is used to minimize fluctuations of expenses not accounted for in annual operating budgets.

WRC worked with its internal fiscal staff to determine if the system's current rate structures were sufficient to meet the current needs for the management of the wastewater system, and to plan for any adjustments that may be required to meet anticipated future expenses. A demonstration of sufficiency of the system's current rate structure was made, as required by the SAW Grant Program, and submitted to the MDEQ six months prior to the SAW grant end date.

CAPITAL IMPROVEMENT PLAN

The asset optimization software forecasts and prioritizes assets that require replacement in the planning period. The individual replacements can be combined into projects and scheduled with budget amounts established. This information is then used in the LRP process to determine rate needs for funding the project established. A list of capital projects was developed for George W. Kuhn Drainage District, using recommendations from the asset optimization software, and consideration of other system needs.

The recommended projects are summarized below. Projects listed for implementation in the 0 to 5 year range include cost estimates prepared on data available at the study/feasibility level. Projects in the 6 to 20 year range are based on broad concepts only and costs are based on cost curves and other general tools. All projects are listed for financial and resource planning purposes only. Changes to project inclusion, scope, cost and/or timing are expected as resources are allocated and changes occur in prioritization, regulations, technology, cost and other data becomes available.

Capital Projects, 0 to 5 years:

- Dequindre Pump Station: Replacement of Pumps and Motors, Pipes, Valves, Generator, Electrical and I&C - Cost $2,502,000
- 8 Mile Meter Chamber – Replacement of Valves – Cost $150,000
- Regulator #1 – Replacement of Valves and I&C – Cost $428,000
- Regulator #6 – Replacement of Valves – Cost $98,000
- GWK Facility – Storage Tank, Pumps, Valves and I&C – Cost $1,492,000
- Stephenson Control Bldg – I&C – Cost $29,000
- Sewer Collection System Repair and Rehabilitation – Cost $1,100,000

Capital Projects, 6 to 20 years:

- The cost estimate provided in the 6 to 20 year capital planning period were developed using WRC's asset optimization tool. It makes recommendations based on the specified parameters configured for the various "triggers," "events," and "strategies." The recommendations do not take into account the effect of WRC's regular preventive or predictive maintenance programs. The asset optimization tool also recommends additional "inspection" events where the condition of individual assets will be reviewed periodically (typically annually), and if condition is still found to be good, recommended replacements will be deferred and may then fall outside the 20 year planning period. These conservative costs are provided for future planning needs only, and will continue to be monitored and adjusted through WRC's annual LRP process. Maintenance and repair history, along with condition of assets, will be reviewed at least annually as part of the rate review process using data and deterioration modeling provided by WRC's CAMS system and asset optimization tool. The estimated costs provided may also change in response to future regulatory needs, affordability criteria, or other considerations that are not foreseeable at this time. Cost - $100,000,000

RECOMMENDATIONS

In order to keep this AMP sustainable into the future, the Long-Range Plan (LRP) process will be undertaken annually to review existing recommendations, status of current projects, and forecasted needs against available reserves and anticipated funding. The asset optimization tool will be regularly synced with CAMS to incorporate any new GIS and operational and condition data. The software will then automatically update recommended events, treatment strategies, and capital projects. The updated recommendations will be reviewed quarterly and as part of the annual LRP to ensure the availability of required funds for the projects.

LIST OF MAJOR ASSETS

The George W. Kuhn Drainage District’s major assets include:

- 663,857 lineal feet of combined sewer, ranging in size from 6” to a triple 12’ Box culvert, utilizing Clay, Ductile Iron, Brick, Non-reinforced and reinforced concrete, cast iron, and PVC.
- 1,345 Combined Manholes
- 239 Combined Inlets
- 64 Combined Access Points
- 5 Combined Flow Regulators
- 1 Retention Treatment Basin (124 MG Facility)
- 2 Lift/Pump Stations

Department of Environmental Quality (DEQ)
Stormwater, Asset Management, and Wastewater (SAW) Grant
Wastewater Asset Management Plan
Certification of Project Completeness

Completion Date: October 31, 2017
(no later than 3 years from executed grant date)

The **George W. Kuhn Drain** (legal name of grantee) certifies that all wastewater asset management plan (AMP) activities specified in SAW Grant No. **1223-01** have been completed and the implementation requirements, per Part 52 of the Natural Resources and Environmental Protection Act, 1994, PA 451, as amended, are being met. Section 5204e(3) requires implementation of the AMP and that significant progress toward achieving the funding structure necessary to implement the AMP be made within 3 years of the executed grant.

Please answer the following questions. If the answer to Question 1 is No, fill in the date of the rate methodology approval letter and skip Questions 2-4:

1) Funding Gap Identified: Yes or **No**

   If No - Date of the rate methodology approval letter: **May 18, 2017**

2) Significant Progress Made: Yes or No, **N/A**

   (The DEQ defines significant progress to mean the adoption of an initial rate increase to meet a minimum of 10 percent of any gain in revenue needed to meet expenses, as identified in a 5-year plan to eliminate the gap. A copy of the 5-year plan to eliminate the gap must be submitted with this certification.)

3) Date of rate methodology review letter identifying the gap: **N/A**

4) An initial rate increase to meet a minimum of 10 percent of the funding gap identified was adopted on **N/A**.

Attached to this certification is a brief summary of the AMP that includes a list of major assets. Copies of the AMP and/or other materials prepared through SAW Grant funding will be made available to the DEQ or the public upon request by contacting:

Jim Nash	at **248-858-0958**	**wrc@oakgov.com**
Name	Phone Number	Email

Signature of Authorized Representative (Original Signature Required) — Date: 10/27/17

Jim Nash, Chairman of the Drainage Board and Oakland County Water Resources Commissioner
Print Name and Title of Authorized Representative