Legislation Details (With Text)

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Title:	Receive a report, hold a discussion and give staff direction regarding the “Manual for the Control, Operations and Maintenance of Zebra Mussels” for design, construction and installation of key improvements to control and monitor zebra mussels for both Lake Ray Roberts and Lake Lewisville raw water sources and supply lines.				
Sponsors:					
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Attachments:	1. Exhibit 1-Final Draft City of Denton Zebra Mussel Manual 5 6 16, 2. Exhibit 2-CIP Detail Sheets, 3. Exhibit 3-COD Zebra Mussel CIP Phasing Recommendations (V2)				

Date	Ver.	Action By	Action	Result

Agenda Information Sheet

DEPARTMENT: **Water Production**

CM/ ACM: **Howard Martin**

Date: **August 22, 2016**

SUBJECT

Receive a report, hold a discussion and give staff direction regarding the “Manual for the Control, Operations and Maintenance of Zebra Mussels” for design, construction and installation of key improvements to control and monitor zebra mussels for both Lake Ray Roberts and Lake Lewisville raw water sources and supply lines.

BACKGROUND

In 2015, Arcadis consulting engineers were selected to perform a study on the zebra mussel issue for both raw water sources and develop zebra mussel management approaches that balance the risk of future infestations with capital spending and potential unintended downstream consequences.

Zebra mussels have major impacts on potable water facilities by attaching to surfaces of pipes, trash rack, screens, gates, valves, pumps; constricting flows and fouling of support infrastructure. Zebra mussel infestation adversely affects the ecosystem and water quality such as decrease turbidity and increase algal and cyanobacteria growth. Increased water clarity allows for greater light penetration and may stimulate growth of blue-green algae increasing taste and odor issues and also increasing the potential for Microsystin that can produce neurotoxins in the source water.

Management, operation and maintenance approaches in the manual considered the following: source water quality including seasonal water quality changes, physical characteristics of each structures to assess the

susceptibility to fouling and the potential impact of fouling, hydraulics including pipeline velocities, capacities and detention times, operational impacts including required labor hours, capital costs and O&M costs, public perception including the selection of publicly accepted technologies. Operation of downstream water treatment plants, zebra mussel biology and ecology, planned future improvements, current and future regulations and risk reduction were considered in the recommendations.

To address the multi-dimensional O&M consideration, a multi-disciplinary team including an academic professor and a retired USACE expert brought a unique perspective to this evaluation. The team also included a technical advisor with years of experience evaluating, designing and managing zebra mussels in the Great Lakes region. Additionally, a number of Water Production staff were involved throughout this project by participating in site visits and workshops and reviewing the Manual.

Site surveys were conducted for both Lake Ray Roberts and Lake Lewisville raw water systems. Site surveys included both design document review and field visits, during which the team gained a greater understanding of what components are at most risk for fouling. In parallel, a review of the zebra mussel management approaches was conducted, including both innovative and conventional technologies. Conceptual layouts and costs were then developed for the top two preventive alternatives in addition to a reactive approach (i.e., physical removal and disposal), and comparison matrices were developed to compare the top alternatives. Recommendations for multi-barrier management approaches within both raw water systems were developed including the following: short and long-term capital improvements, monitoring and inspection guidelines, operations and maintenance guidelines, and risk management approaches. Key risk review considerations included, likelihood of infestation and potential impact to the operations in case of fouling.

Mussel management approaches were classified as preventive, control, reactive strategies, or a combination thereof. For example, a management approach might include an oxidant which can prevent settlement of veligers when low doses are maintained through the system (i.e. a preventive strategy) and kill adult mussels a higher dose (i.e. control strategy), as well as provisions for physical removal and disposal (i.e. a reactive strategy).

Upon completion of chemical demand testing (conducted in April and June of 2015) and further evaluation of copper alternatives, staff further narrowed the short-list of chemicals alternatives by selecting the top two most feasible chemicals for further evaluation. The short-list of alternatives included metal alloys, sodium permanganate, copper ion generation systems and physical removal. An evaluation of disposal methods was also completed and landfilling was recommended.

Primary recommendations for Lake Lewisville include rebuilding the intake bar screen in stainless steel with a copper alloy coating along with a redesign to make the screen removable, and adding chemical immediately after the bar screen to protect all downstream components including the raw water pumps. Additional recommendations include maintenance improvements (e.g. manway installations), operational enhancements (e.g. operating pumps and valves frequently), and risk management strategies (e.g. monitoring and inspections).

Primary recommendations for Lake Ray Roberts include improvements to the raw water pipelines to provide additional access and adding a chemical feed point in valve vault #1 to protect all downstream components including the raw water pumps. Due to environmental release through the US Army Corps of Engineer structure into the Elm Fork of the Trinity River, chemical cannot be applied any further upstream. Additional recommendations include maintenance improvements (e.g. manway installations), operational enhancements (e.g. operating pumps and valve frequently), and risk management strategies (e.g. monitoring and inspections).

Recommendations/Actions

Staff recommends approval of the 'Manual for the control, operation and maintenance of zebra mussels" and associated budget in the amount of $5,530,000 for design, construction and installation of key improvements to control and monitor zebra mussels.

Prior Action Review (Council, Boards, Commissions)

January 26, 2015 PUB approval of a "Professional Service Agreement" with Arcadis U.S., Inc. to identify control measures to combat zebra mussels for the Lake Ray Roberts and Lake Lewisville water treatment facilities; authorizing the expenditure of funds in an amount not-to-exceed $148,623.00

February 3, 2015 City Council approval of the "Professional Service Agreement" with Arcadis U.S. Inc. and associated cost of $148,623.00.

April 27, 2015 PUB approval of "Declaration of an Emergency" and associated cost in the amount of $490,311.22 for cleaning zebra mussel infestation from the Lake Ray Roberts water treatment plant supply pipeline.

May 5, 2015 City Council Approval of the "Declaration of an Emergency" and associated pipe cleaning cost of $493,311.22.

Fiscal Information

Arcadis' estimate for the total recommended control and monitoring for zebra mussels for both raw water sources is $5,530,000 versus the current funded CIP projects of $4,200,000. The phased approach will construct the critical chemical feed components first and staff would allocate the additional funds in fiscal year 2018 for the remaining recommendations. Once the chemical treatments are installed, each raw water pump station will have a second and different chemical feed system for a dual chemical control approach.

For fiscal year 2017, the estimate for the Lake Lewisville raw water chemical feed facility and middle intake is $2,500,000 and for the chemical feed facility design and raw water line improvements at Lake Ray Roberts it is estimated at $1,100,000 for a total of $3,620,000 from the current CIP projects of $4,200,000 leaving $580,000. The 2018 fiscal year funds for the second chemical feed equipment is $350,000 for Lake Lewisville and two chemical feed systems $1,560,000 for Ray Roberts. The total additional funding for fiscal year 2018 to add all the recommended controls and monitoring is $1,330,000. This information was not available in time for this current year's budget/CIP cycle and will need to be added during next budget/CIP process in 2017. Arcadis noted in their recommendations some training for staff that will teach them how to collect and perform microscopic examinations of raw water samples for the presence of zebra mussels for $20,000 "Interactive Field and Laboratory Training on Veliger and Adult Mussel Identification."

Estimated Schedule of Project

2017
Lake Lewisville Sodium Permanganate feed system installation and Copper Ion skid design
Lake Ray Roberts Sodium Permanganate and Copper Ion feed systems design
Lake Ray Roberts raw water line improvements and new potable water line
Field and Laboratory training on Veliger and adult mussel identification

2018
Lake Lewisville Copper Ion skid installation
Lake Ray Roberts Sodium Permanganate and Copper Ion feed systems installation

STRATEGIC PLAN RELATIONSHIP

The City of Denton's Strategic Plan is an action-oriented road map that will help the City achieve its vision. The foundation for the plan is the five long-term Key Focus Areas (KFA): Organizational Excellence; Public Infrastructure; Economic Development; Safe, Livable, and Family-Friendly Community; and Sustainability and Environmental Stewardship. While individual items may support multiple KFAs, this specific City Council agenda item contributes most directly to the following KFA and goal:

Related Key Focus Area: Choose an item.
Related Goal: Choose an item.

EXHIBITS

1. Manual for the Control, Operations and Maintenance of Zebra Mussels
2. FY 2015, 2016, 2017 CIP Detail Sheets
3. "Phasing of Improvements for Zebra Mussel Management" by ARCADIS

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