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Northeast WTP Repurposing - 2023 Update

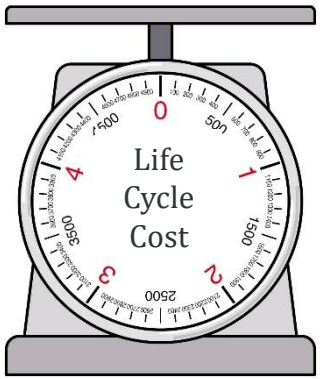
June 28, 2023
GLWA Board Meeting

Revisiting 2015 Master Plan Recommendations

- Master Plan Recommendation: Repurpose Northeast and reduce treatment capacity at other WTPs.
- Compare rehab of NE versus decommissioning (both alternatives provide 160 MGD of finished water supply at NE site).

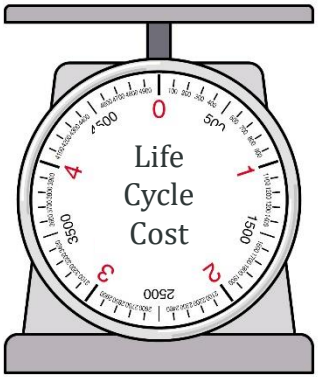
Rehabilitate Northeast WTP to 160 MGD

CIP ######
Northeast WTP Rehab



Repurpose Northeast WTP (WWP to NE transmission)

CIP 122003 (Phase 1)	CIP 115003	CIP 122017	CIP 122018
Northeast Flow Control Facility	WWP to NE Transmission Main	7 Mile/Nevada Transmission	Garland/Bewick/ Hurbut Rehab



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Key Considerations

- Operational Considerations
- Regulatory Considerations
- Life Cycle Cost Update
- Canceled Project Capital Expenditures
- What changes in CIP if we keep Northeast in service?
- Future Capacity of NEWTP

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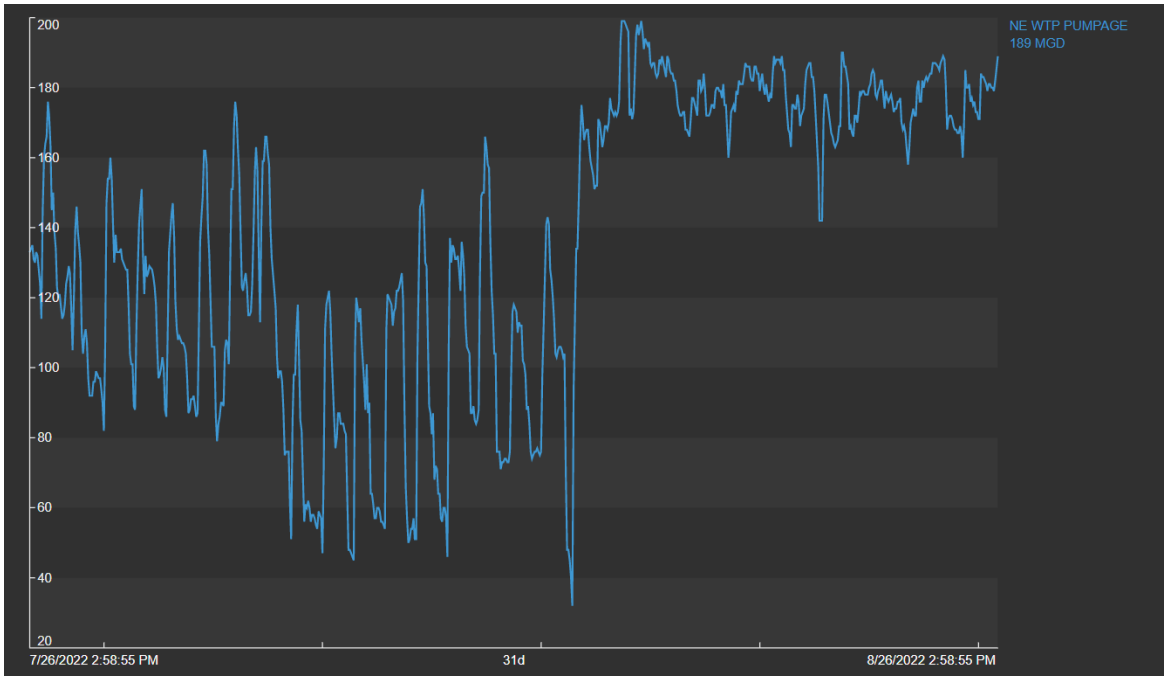
Operational Considerations

- Prior analyses focused on non-peak emergency scenario.
- Excess capacity at Northeast WTP useful during 120-inch main break (during August in peak usage scenario).
- NE Pumpage was sustained well above supply capacity of proposed piping under decommissioning scenario.



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Regulatory Considerations

- NE WTP has several larger scale deficiencies noted from sanitary survey that can't likely wait any further to be addressed:
  1. Flocculation System upgrades already in process.
  2. Filter Upgrades needed.

Sanitary Survey Deficiency Note
The flocculator drive motors have not functioned for years, and the flocculator paddles are not operable. Therefore, the Northeast WTP is not operating as designed. EGLE issued permit #209145 on November 6, 2020, that will replace the existing flocculators. EGLE understands that the project is currently out to bid. This deficiency will be considered outstanding until the new flocculators are installed and in service. **Please submit a construction schedule for this project by June 30, 2021.**
The sedimentation basin sludge has not been removed for almost two years. Under routine operations, sludge is removed annually and sent to the landfill. Due to COVID-19 emergency operations, sludge was not removed from the sedimentation basins during 2020. Historical annual sludge removal reports show sludge accumulation of up to 3.5 feet in areas, which means over two years sludge accumulation are expected to be higher. This results in a lower residence time in the sedimentation basins than the pretreatment system was designed for and places a higher burden on the filtration and disinfection system. Additionally, significant sludge accumulation can cause anaerobic conditions which could contribute to taste, odor, and turbidity issuesin the filter influent water. Sludge removal should be completed annually. EGLE understands that the new sludge removal contract is in process. This deficiency will be considered outstanding until the sludge is removed from all sedimentation basins. **Please indicate in the the Survey Response Letter (SRL) the anticipated timeline for sludge removal.**
The individual filter flow meters and loss of head meters are not operational, and **the troughs exhibit severe corrosion**. At the time of the Survey, **the surface sweeps on the south filter plant were not operational** due to the cone valve project. Surface sweeps serve to break up the top layer of media and keep surface solids from compacting and causing mudballs in the filter media. Filter performance should be monitored closely during times where projects impact routine filter functions. Filters are one of the final barriers in the water treatment process. Therefore, it is critical that all appurtenances and meters are functional to properly determine filtration rates, the need for backwash, and conduct backwashes as designed. The filter flow meters, loss of head meters, corroded troughs, and surface sweeps need to be refurbished or replaced to ensure optimal operation of the filters. **Please indicate in the SRL how GLWA plans to address these issues.**

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Life Cycle Cost Evaluation

2023 NE Decommissioning LCA Update					
Alternative	**Capital Cost**	**Additional Annual O&M Cost**	**Salvage Value (P/F, 4%, 20yrs.)**	**Present Worth of Annual O&M Cost (P/A, 4%, 20yrs)**	**Net Present Worth**
Northeast Rehabilitation	$267,800,000	$5,176,472	$42,400,000.00	$70,300,000.00	$295,700,000
Northeast Repurposing	$428,000,000	$3,150,608	$156,300,000.00	$42,800,000.00	$314,500,000

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Northeast Repurposing Option (new transmission) Capital Costs

	Project	2023 Capital Cost
New Transmission Main Projects	Northeast Flow Control Facility (CIP 122003 Phase 1)	$24,000,000
	81-inch water transmission main from Northeast to I-94 (CIP 122003 Phase 2)	$174,000,000
	7 Mile and Nevada Pipeline Renewal	$100,000,000
	Garland/Bewick/Hurlbut Pipeline Renewal Project	$100,000,000
	66-inch water transmission main from I-94 to Sylvester (CIP 122003 Phase 3)	$30,000,000
	Total Capital Cost	**$428,000,000**

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NE Rehab Option Capital Cost

No.	Project	2023 Update - Capital Costs 1
1	Chain and Flight Sludge Removal System and Solids Handling Facility 2	--
2	Filter Building Rehab	$100,510,000
3	Low Lift Pump/Valve Replacement	$40,190,000
4	Raw Water Tunnel Rehab 3	--
5	Steam and Condensate System Replacement	$30,580,000
6	Rapid Mix/Flocculation Rehab 4	$2,290,000
7	Plant-wide Electrical Upgrades	$12,410,000
8	Architectural Upgrades to All Buildings	$11,010,000
9	Chem Feed Systems Replacement	$12,740,000
10	Roof Replacement	$7,070,000
11	Plant-wide Mechanical Upgrades	$13,790,000
12	Ventilation/Air Conditioning System and Ducting Replacement	$8,250,000
13	Plant-wide Structural Repairs	$6,430,000
14	Replace all Access Roads	$4,110,000
15	Wash Water Building Rehab	$2,250,000
16	Raw Water Conduit/Venturi Meter Rehab	$4,370,000
17	Inspect/Replace 12-inch Service Water Main	$6,220,000
18	Sed Basin Valve and Gate Replacement	$1,260,000
19	Replace Belt Drains/Underdrain Systems	$3,790,000
20	Backflow Preventers	$530,000
	Total Capital Costs	**$267,800,000**

1 NE Rehab costs escalated from November 2019 ENR Construction Cost Index (11,381) to June 2022 Construction Cost Index (13,111).

2 Sludge removal costs moved into contract plant services annual O&M.

3 Raw Water Tunnel Rehab Substantial Complete.

4 Flocculator and control gates replacement under construction.

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Canceled Project Capital Expenditures
As of April 30, 2023

Project	Description	Placed In Service (Capitalized)	Remaining CWIP Balance (to Capitalize)	Remaining CWIP Balance (To Expense)
122003	Waterworks Park to NE Transmission Main	$29,800,000	$400,000	$8,500,000
122017	Seven Mile/Nevada Transmission Main	$0	$0	$8,300,000
122018	Garland, Hurlbut, Bewick Transmission Main	$0	$0	$2,700,000
	Total	**$29,800,000**	**$400,000**	**$19,500,000**

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What changes in CIP if we keep Northeast in service?

- Projects that may be cancelled if NE treatment is kept in services:
    1. 122018 – Garland, Hurlbut, and Bewick Transmission Main Renewal Project
    2. 122003 – Water Works Park to Northeast Transmission Main Project (Phases 1-3)
- Projects that may in part or whole be cancelled if NE treatment is kept in services:
    1. 122017 – 7 Mile and Nevada Transmission Main Renewal Project
- For FY25-29, one additional project will be added to the CIP if NE treatment is maintained:
    1. 112### - NE Filter Rehab Project
- For FY25-29, projects that will remain for NE WTP if treatment is kept in service include the following:
    1. 112003 - Northeast Water Treatment Plant High-Lift Pumping Station Improvements
    2. 112007 - NEWTP-Header Galleries and Washwater Building Structural Repair
    3. 112006 - Northeast Water Treatment Plant Flocculator Replacements (in process)
- > FY29, Additional projects that will be added to the CIP if NE treatment is maintained include:
    1. 112### - NE Low Lift Improvements (may be consolidated with high lift project)

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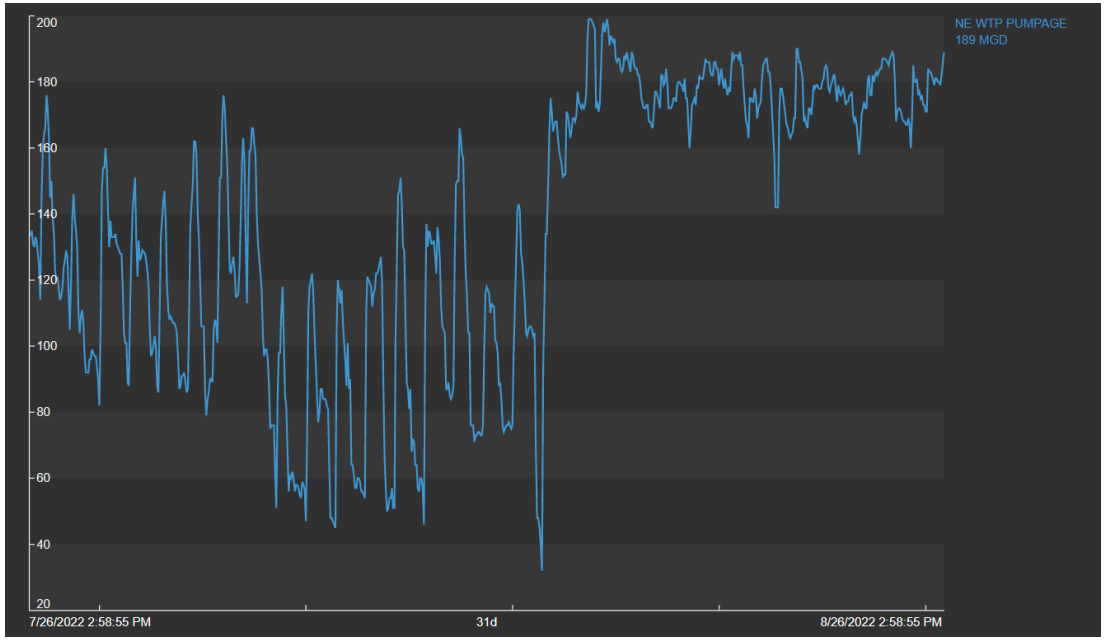
Future Capacity of NEWTP

- Emergency break scenario defines design capacity of NE WTP.
- Flows observed during break ranged from 160 to 200 MGD.
- Design treatment capacity for NE WTP will be reduced from 300 MGD to 200 MGD.
- Significant right-sizing can still be achieved at the NE WTP.



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Findings

- Excess capacity at NE WTP was useful for emergency scenario and under a broader range of demand conditions.
- Current regulatory environment doesn't permit delay of key projects at NE WTP (e.g. filter rehab project).
- Higher cost of pipeline projects results in LCA in favor of keeping NE treatment online.

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Key Alternatives – Northeast WTP Rehab Option Scope

Northeast WTP Repurposing Updated Life Cycle Cost Evaluation - 2022

Needs assessment identified critical projects:

- Filter Building Rehab
- Low Lift Pump Station Rehab
- Building Mechanical Upgrades (HVAC, water service, natural gas, compressed air)
- Building Architectural Upgrades (grating, windows, handrail, doors, hatches)
- Roof Replacement
- Rapid Mix Rehab

Notes:

1. Solids handling covered under long term O&M Costs
2. Raw Water Tunnel Rehab nearing completion - not included in capital costs.
3. NE Flocculation nearing completion – not included in capital costs

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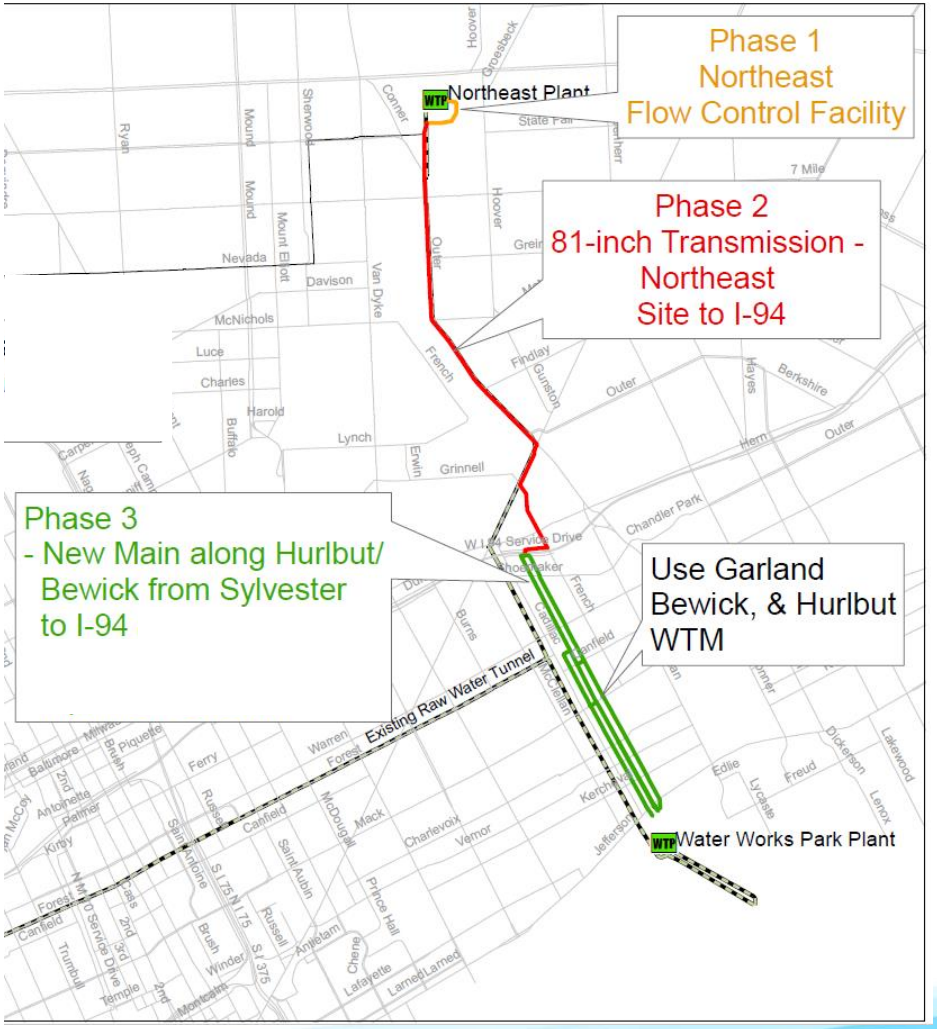
Key Alternatives – WTP Repurposing Alternative (new transmission)

- Northeast Flow Control Facility (Phase 1) - Common to both alternatives. Not factored into cost analysis.
- New 81-inch water transmission main from Northeast to I-94 (Phase 2)
- New 66-inch water transmission main from I-94 to Sylvester (Phase 3)
- Use existing water transmission mains in Garland, Hurlbut, and Bewick to transmit flows from Water Works Park to Northeast



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Alternatives Analysis – Non-Cost Factors

Northeast Repurposing Pipeline Advantage?	Non-Cost Factor	Northeast Plant Rehabilitation Advantage?	
=	Reliability	=	While NE Operations have been consistent over the recent past, the reliability provided by Garland/7 Mile mains narrows the margins
=	Constructability	=	Northeast Repurposing pipeline construction has potential for more environmental, property acquisition, geotechnical, and utility conflict issues, but maintenance of service, multi-disciplinary nature of plant work for Northeast Rehabilitation is equally challenging.
✓	Maintainability		Maintaining transmission system is less complex than maintaining mechanical systems at a rehabilitated water treatment plant. Transmission System easier to maintain then raw water tunnel
=	Operability	=	Northeast WTP can be taken out of service by treatment train but this issue is mitigated in large part by use of Garland/7 Mile Mains in future. Furthermore, longer service life for pipeline alternative means less frequent disruptions to service for future capital upgrades.
	Accessibility	✓	WTP equipment is visible in terms of condition/performance, however, GLWA would design new pipeline for ready access for in-site inspection.
✓	Work Environment		Close proximity to high-voltage electricity, chemical storage, and heavy mechanical equipment at WTP requires more safety training and is slightly more adverse as working in pipeline repair/construction environment with associated trench/confined space issues. Moreover, even with Northeast Rehabilitation expenditures, you still have 1958 plant infrastructure and technology
	Community Impacts	✓	Less work in public right-of-way means less community impacts. Impacts of pipeline construction have been minimized. Community risks reduced due to elimination of chemical treatment requirements at the Northeast site.
✓	Scheduling and Permitting		More staging requirements for WTP work means extended schedule for Northeast Rehabilitation.
✓	Water Quality		Enhanced ozone treatment provided with finished water treatment from Water Works Park
✓	Future Regulatory Requirements		With only 4 WTPs in operation, future regulatory requirements would be more costs effective to implement

What changes in CIP if we keep Northeast in service?

- Capital projects will have to be re-prioritized to fit the NE Filtration within the FY25-29 period and stay within the current 5 year planned spend of $957M

Cip No.	Description	WE Total FY25-29 adjusted
112###	Northeast Filter Rehab Project	$72,000,000
122004	96-inch Water Transmission Main Relocation and Isolation Valve Installations	$144,175,350
122017	7 Mile/Nevada Transmission Main Rehab and Carrie/Nevada Flow Control Station	$0
170803	170803: Reservoir Inspection, Design, and Construction Management Services Phase III	$21,000,000
111001	Lake Huron Water Treatment Plant, Low-Lift, High Lift and Filter Backwash Pumping System Improvements	$99,131,620
112003	Northeast Water Treatment Plant High-Lift Pumping Station Improvements	$0
115007	Water Works Park High Lift Pumping Station Modernization	$0
114010	Springwells Water Treatment Plant, Yard Piping and High-Lift Header Improvements	$0
112007	NEWTP-Header Galleries and Washwater Building Structural Repair	$6,356,745
115001	Water Works Park Water Treatment Plant Yard Piping, Valves and Venturi Meters Replacement	$11,085,064
111012	LHWTP-Flocculation Improvements	$49,372,152
170900	Suburban Water Meter Pit Rehabilitation and Meter Replacement	$13,840,240
122018	Garland, Hurlbut, Bewick Water Transmission System Rehabilitation	$0
170305	170305: WWP SCADA Network Upgrade	$4,713,756
170504	Transmission Mains Valves and Urgent Repairs Contract 1	$5,000,274
111009	Lake Huron Water Treatment Plant - High Lift Pumping, Water Production Flow Metering and Yard Piping Improvements	$4,294,038
115005	WWP WTP Building Ventilation Improvements	$6,225,535
170306	SPW SCADA PLC Network Upgrade	$3,341,343
132015	Newburgh Road Booster Pumping Station Improvements	$0
114002	Springwells Water Treatment Plant, Low-Lift and High-Lift Pumping Station Improvements	$157,512,283
170802	Reservoir Inspection, Design, and Construction Management Services Phase II	$31,942,535
381000	Power Quality: Electric Metering Improvement Program	$985,189
132019	Wick Road Pumping Station Improvements	$0
122016	Downriver Transmission Main Loop	$46,100,000
115009	Water Works Park Sedimentation Basins Structural Upgrades	$8,333,367
122019	Jefferson Main Replacement Project	$38,582,592
116002	Pennsylvania and Springwells Raw Water Supply Tunnel Improvements	$12,088,409
171502	Lake Huron and Southwest Roof Replacement	$0
170801	Reservoir Inspection, Design and Construction Project at Imlay Station, Lake Huron Water Treatment Plant, Springwells Water Treatme	$0
111006	Lake Huron Water Treatment Plant, Filter Instrumentation and Raw Water Flow Metering Improvements	$35,092,503
132016	North Service Center Pumping Station Improvements	$90,000,000
122007	Merriman Road Water Transmission Main Loop	$0
122003	Water Works Park to Northeast Transmission Main	$0
170500	Transmission System Valve Rehabilitation and Replacement Program	$12,351,082
170601	Linear System Integrity Program - Contract 1	$9,029,754
112006	Northeast Water Treatment Plant Flocculator Replacements	$6,305,917
116007	System Electrical Power Improvements	$2,658,128
170300	Water Treatment Plant Automation Program	$5,775,358
116006	Belle Isle Intake System Rehabilitation and Improvements	$993,633
114017	Springwells Water Treatment Plant Flocculator Drive Replacements	$19,113,352
132014	Adams Road Pumping Station Improvements	$0
113009	SW Flight and Chain Upgrades	$2,550,000
115006	Water Works Park Site/Civil Improvements	$0

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