City of Pataskala Utility Department
Nathan W. Coey, Utility Director

➢ Director Update

- 2018 Utility Capital Projects. 2018 budgeting cycle is underway with review of Utility Capital Improvement Projects. Under the Utility Sewer Water Infrastructure Management Schedule (SWIMS), the following projects will be recommended in the 2018 budget.
  - WRF Phosphorus Upgrade Project. I anticipate phosphorus limits in our NPDES permit in the near future. Biological nutrient removal includes increased sludge yields and consequently more equipment to process and store biosolids. In 2018 I will recommend the purchase of additional dewatering equipment with improved capture rates to reduce the soluble phosphorus load on the treatment process. Reducing the unnecessary load on the biological reactor may eliminate the need for additional phosphorus removal equipment. The current press is undersized and poor capture rate of 75%, current units on the market are in the 95% to 99% capture rate. I anticipate a budgetary request of $400,000 to accomplish our 2018 goals. Capacity funds could be utilized for phase one of this project.
  - Creek Road Water Main Project. In efforts to improve hydraulic exchange in the distribution system, 3,000 feet of a new 12 inch water main on Creek Road from Township to the transmission main near River Forest is recommended. Currently the 12 inch transmission main from WTP2 transitions to a 6 inch transite (asbestos-cement) pipe on Creek Road and causes a hydraulic 'bottleneck' in the system. Pending additional consultant review, I anticipate a budgetary figure for this project to be $480,000 in the form of debt service.
  - Denison, Poplar, and Willow Water Main Project. The water mains in this area are horribly undersized ranging from 2 inch to 4 inch. Project includes 1,800 feet of 8 inch main for proper hydraulic flow and system loop improvements to support fire flow. Pending consultant review I anticipate a budgetary figure for this project in the $300,000 range in the form of debt service.

- **Water Department**

  - Well pump and motor at WTP2 is installed and working well.
  - A summary has been completed on the Water Hydraulic Model Study. Final report is expected in the following weeks. Upon release I will detail some of the findings in a future report to council. Recommendations at this point revolve around removing system bottle necks.

- **Water Reclamation Department**

  - The lime blend system has been installed on the press in efforts to improve dewaterability and for odor control.
  - Researching options for a new bed and crane on the WRF Ford 450.

- **Billing Department Update**

  - The Billing Department continues to provide timely and outstanding customer service in their daily duties.

Highest Regards, Nathan W. Coey, Utility Director

Pataskala Modeling Summary

Model Calibration

- Nine hydrant flow tests conducted throughout the system. Tables below summarize the calibration groups established for the model based on City provided GIS data and the results of the calibration.
- Modeled residual pressures were within ±5 psi of field measurements, therefore the model is considered calibrated.

Calibration Group	Final C-Factor
Ductile Iron Installed Prior to 1970's	110
Ductile Iron Installed 1970 - 1980	120
Ductile Iron Installed 1980 - 1990	130
PVC Installed 1980-1990	130
PVC Installed 1990 - 2000	138
Water Main Installed after 2000	140

Test No.	Zone	Field Residual Pressure (psi)	Model Residual Pressure (psi)	Field Measured Fire Flow (gpm)	Field and Model Residual Pressure Difference (psi)
1	High	32	33	949	1
2	High	59	57	1187	-2
3	High	51	47	1100	-4
4	High	58	58	1163	0
5	Low	31	28	888	-3
6	Low	29	28	872	-1
7	Low	37	40	1113	3
8	Low	30	26	919	-4
9	Low	35	37	949	2

Hydraulic Analysis and Areas of Concern

- Three areas of concern reviewed based on discussion with the City:

1. Bottlenecks Near SE Tank.
    - **Concern:** 12-inch main from WTP2 and SE Tank connect into 6- and 8-inch water mains along Creek Road and immediately NW of the SE tank, creating a hydraulic bottleneck. This creates unnecessarily high headloss, especially when WTP1 is not in operation and the booster station is in operation. Since WTP2 is operated as the primary source, this scenario can and does happen.

    - **Recommendation:** Replace the 6- and 8-inch mains with 12-inch to eliminate the hydraulic bottlenecks. This will help stabilize pressures throughout the Low Pressure Zone and increase minimum pressures when WTP1 is not in service. For instance, modeling results indicate pressure in the Hazelton Development may range from ~40 to 55 psi on a max day with the bottlenecks in place. This changes to ~51 to 55 psi with the proposed 12-inch main improvements.

2. Hazelton and Carrington Ridge Developments
    - § **Concern:** Increased demands from new developments may reduce pressures in the system and warrant the need for a new storage tank in the development area.

    - § **Recommendation:** Proceed with removing bottlenecks noted in Item 1. Currently do not recommend installing a new tank in the Hazelton Development. Capacity evaluation indicates there is enough storage in the Low Zone to support current max day demands. Adding in a third tank in the Low Pressure Zone, separated from the other two, will further complicate operation in an area where one tank is already out of service for similar reasons. An additional 8-inch main was modeled along Hazelton-Etna Road to increase supply to the new developments, but provided little additional benefit after the elimination of the WTP2 and SE Tank bottlenecks.

3. Booster Station and Immediate Area Upstream
    - § **Concern:** Low pressures (30 psi, sometimes lower) observed on upstream side of booster station.

    - § **Recommendation:** A new 8-inch dedicated transmission main was modeled from the SE tank area to the 12-inch main on Broad Street upstream of the booster station. This did help alleviate low pressures in the northwest portion of the Low Zone but provides little benefit to pressures leading to the booster station. Low pressures at the station are a result of elevations at the booster station and the operating HGL of the Low Zone, which a new main will not fix. Max HGL based on tank overflows is approximately 1140 ft. Elevations near the booster are in the 1050-1060 ft range, meaning the max pressure that can be provided in a best case scenario is in the mid 30's psi. Removing the bottlenecks in Item 1 will help support flow to the booster and stabilize suction pressures. Only way to increase suction pressures for the station are to increase the operating HGL of the Low Zone. This would be a rather large and involved process of raising the tanks / putting in new tanks with higher elevations. Could potentially also move the booster station further west to a lower elevation area, but that would also be costly and also require reconfiguring zone boundaries.

Headley Mills Tank Operation

- Three alternatives were reviewed to place the Headley Mills Tank back in service:

    1. Altitude Valve on SE Tank and Removal of Bottlenecks
        - § **Alternative Modifications:** This alternative included the following changes:
            - Altitude valve on SE tank
            - WTP1 HS Pump speed increased from 48 to 54 Hz
            - WTP1 and WTP2 set to operate off Headley Mills tank levels instead of SE tank levels
            - 12-inch mains installed as discussed above to remove bottlenecks

- **Discussion:** Model results indicate the Low Pressure zone can operate based on Headley Mills Levels with an altitude valve at SE Tank. The 12-inch main improvements to remove bottlenecks are also important to this alternative to allow sufficient transfer of flow from the SE Tank into the Low Pressure Zone and to equalize the operating HGL. This does reduce turnover in the SE Tank as the altitude valve will close as the level reaches overflow and Headley Mills continues to fill.

2. Split the Low Pressure Zone into a Headley Zone and SE Tank Zone
   - **Alternative Modifications:** This alternative included the following changes:
     - Valves closed on S High Street, Hazelton Etna Road, and Township Road. Area north of these valve closures creates the Headley Zone. Area south creates the SE Tank Zone.
     - New 10-inch transmission main from WTP1 connects into new Headley Zone just north of valve closures
     - WTP1 set to operate specifically off Headley Mills tank
     - WTP1 HS Pump speed increased from 48 to 54 Hz
     - WTP2 set to operate specifically off SE Tank
     - 12-inch mains installed as discussed above to remove bottlenecks

   - **Discussion:** This alternative splits the Low Pressure Zone into two new zones with the zone boundary at the railroad tracks by dedicating WTP1 to operate based on Headley Mills levels and WTP2 to operate based on SE Tank levels. This alternative allows Headley Mills to turn over but complicates system operation by introducing another pressure zone. Additional control valves would also be recommended to open the zone valves in case of emergency. Installing the 12-inch to remove the bottlenecks is still recommended for this scenario to help stabilize pressures and provide additional capacity during emergency situations. The installation of a new transmission main would be more expensive than utilizing an altitude valve to turn over the Headley Mills Tank.

3. Place in Operation with Bottleneck and New Booster Station Main Improvements
   - **Alternative Modifications:** This alternative included the following changes:
     - WTP1 HS Pump speed increased from 48 to 54 Hz
     - 8-inch main installed in SE Tank area to the 12-inch main on Broad Street upstream of the Booster Station
     - 12-inch mains installed as discussed above to remove bottlenecks

   - **Discussion:** This alternative places the Headley Mills Tank in service with improvements above. These upgrades improve the capability of the system to convey flow north. Simulations indicate this will allow the Headley Mills tank to be placed in service while the system operates off the SE tank. Modeling results indicate operating the system this way will result in the Headley Mills tank fluctuating with the SE tank during a maximum demand day but approximately 5 to 6 ft below the SE tank

level. This alternative is more expensive than the altitude valve but may provide better turnover for both tanks combined.

Draft Recommendation Summary

- Highest priority recommendation is to remove the 6- and 8-inch bottlenecks restricting flow from SE Tank and WTP2 into the Low Pressure zone.
- New tank in Hazelton Development does not appear to be needed based on current maximum day demands. Removing bottlenecks will further allow existing storage to better supply this area
- Utilize an altitude valve at SE Tank and removal of bottlenecks is likely the most cost effective recommendation to bring the Headley tank back in service but will reduce turnover in SE tank.
- A new transmission main from the SE tank to the 12-inch on Broad Street, along with the bottleneck improvements, will allow Headley Mills tank to be placed in service and float approximately 5 feet below SE tank. This alternative will be a higher cost than installing an altitude valve.

City of Pataskala Utility Department

Sewer **W**ater **I**nfrastructure **M**anagement **S**chedule (**SWIMS**)

		Location					
Project Name	Project ID	From To	Feet	Details	Priority	Target	Project Estimate
Wood Street Sewer Project	SWC-17-001	Rail Road - Mill	1,600	Re-line 8 inch clay for I & I remediation	2	2019	$256,000
Broadway Street Sewer Project	SWC-17-002	Wood - End	1,100	Re-line 8 inch clay for I & I remediation	2	2021	$176,000
Linda, Liden, Tyler Sewer Project	SWC-17-003	Broad - Library	4,000	Re-line 8 inch clay for I & I remediation	2	2022	$640,000
Oak Meadow Sewer Project	SWC-17-004	Broad - Bent Tree	2,100	Re-line 8 inch clay for I & I remediation	2	2022	$336,000
Melody, Veasy, Robin Sewer Project	SWC-17-005	Oak Meadow - Pat Haven	2,920	Re-line 8 inch clay for I & I remediation	2	2023	$467,200
Jefferson Street Sewer Project	SWC-17-006	Front - Mill	1,900	Replace 16" VCP with 24" PVC	2	2020	$304,000
Willow/Poplar Sewer Project	SWC-17-007	Main - Township	1,400	Re-line 8 inch and 24 inch sewer for I & I remediation	2	2023	$224,000
Creek Road Sewer Project	SWC-17-008	Mill - Creek Lift Station	1,500	Re-line 24" concrete pipe and aerial crossing	2	2024	$240,000
Township/International Sewer Project	SWC-17-009	Broad - Main	2,200	Re-line 8" and 15" VCP in the area	2	2019	$352,000
Creek Road Lift Station Project	SWC-17-010	Creek Road Station		Update/replaced dated equipment	1	2019	$850,000
WRF Phosphorus Upgrade Project	SWC-17-011	WRF		Phosphorus removal, digestion, dewatering	1	2018	$2,000,000
SE Tower to Booster	WTC-17-001	SE Tower - Booster	7,000	New 12" from tower to booster-ROW	3	2024	$1,675,000
Mill Street Water Project	WTC-17-002	Jefferson - End	2,100	New 8" to support proper hydraulic flow	2	2020	$336,000
Creek Road Water Project	WTC-17-003	Township - River Forest	3,000	New 12" to support proper hydraulic flow	1	2018	$480,000
Granville Water Project	WTC-17-004	High - End	2,600	Replace 4" with 8" Granville, Mulberry, and loop to Mill	2	2020	$416,000
Dennison-Poplar-Willow Water Project	WTC-17-005	Front - Willow	1,800	Replace 4" and 2" with 8" to support hydraulic flow	1	2018	$288,000
3rd Ave Water Project	WTC-17-006	Main - Vine	900	Replace with new 8" main	3	2022	$144,000
2nd Ave Water Project	WTC-17-007	Main - Vine	900	Replace with new 8" main	3	2023	$144,000
1st Ave Water Project	WTC-17-008	Main - Vine	900	Replace with new 8" main	3	2024	$144,000
Town Street Water Project	WTC-17-009	Main - Vine	900	Replace with new 8" main	3	2025	$144,000
High Street Water Project	WTC-17-010	Granville - 2nd Ave	1,600	Replace 6" with new 8", new RR cross for hydraulic flow	3	2026	$256,000
Main Street Phase 2 Water Project	WTC-17-011	Broad - Front	2,500	Replace existing with new 12" for hydraulic flow	2	2019	$400,000
Jefferson Street Water Project	WTC-17-012	Rail Road - Mill	1,700	Replace with new 8" main for hydraulic flow	2	2020	$272,000
Broadway & Licking Water Project	WTC-17-013	Main - End	2,400	Replace with new 8" main for hydraulic flow	3	2021	$384,000
Wood Street Water Project	WTC-17-014	Mill - End	1,700	Replace with new 8" main for hydraulic flow	3	2022	$272,000
BWT Tower 1 Paint Project	WTC-17-015			New coating in and out	3	2020	$275,000
BWT Tower 2 Paint Project	WTC-17-016			New coating in and out	3	2020	$275,000
WTP1 Upgrade Project	WTC-17-017			Update/replaced dated equipment	2	2019	$2,700,000
		Sewer Feet	18,720			Sewer	$5,845,200
		Water Feet	30,000			Water	$8,605,000
		Total	48,720			Total	$14,450,200

City of Pataskala Utility Department

Sewer **W**ater **I**nfrastructure **M**anagement **S**chedule (**SWIMS**)

	Target Year		Total Funds Needed	Water	Sewer
	2018		$2,768,000	$768,000	$2,000,000
	2019		$4,558,000	$3,100,000	$1,458,000
	2020		$1,878,000	$1,574,000	$304,000
	2021		$560,000	$384,000	$176,000
	2022		$1,392,000	$416,000	$976,000
	2023		$835,200	$144,000	$691,200
	2024		$2,059,000	$1,819,000	$240,000
	2025				
	2026				
Total		7	$14,050,200	$8,205,000	$5,845,200