

HRG

Herbert, Rowland & Grubic, Inc.
Engineering & Related Services

AN EMPLOYEE-OWNED COMPANY

Special Study: Pump Station and Water Pollution Control Plant Upgrades Update



January 11, 2021

Agenda

- > **Flow Monitoring Study**
 - Historic Overflows and Results
 - Sources of Inflow and Infiltration
- > **Harmony Pump Station**
 - Pump Station Location and Description
 - Deficiencies
- > **Water Pollution Control Plant (WPCP)**
 - Location and Description
 - Deficiencies
- > **Alternatives Considered**
- > **Customer Impact**
- > **Conclusions**



Flow Monitoring Study

Historic Overflows and Study Results
Sources of Inflow and Infiltration



Historic Overflows and Study Results

8.17 MGD Plant Flows



Effluent Chamber Overloading



Historic Overflows and Study Results

Flooded Excess Flow Tank 1 & 2

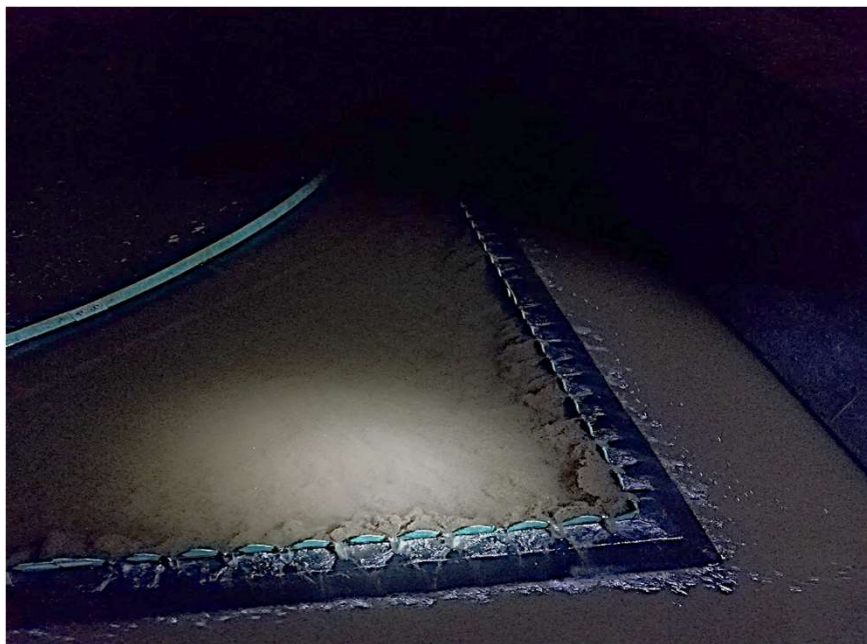


Flooded Electrical Equipment



Historic Overflows and Study Results

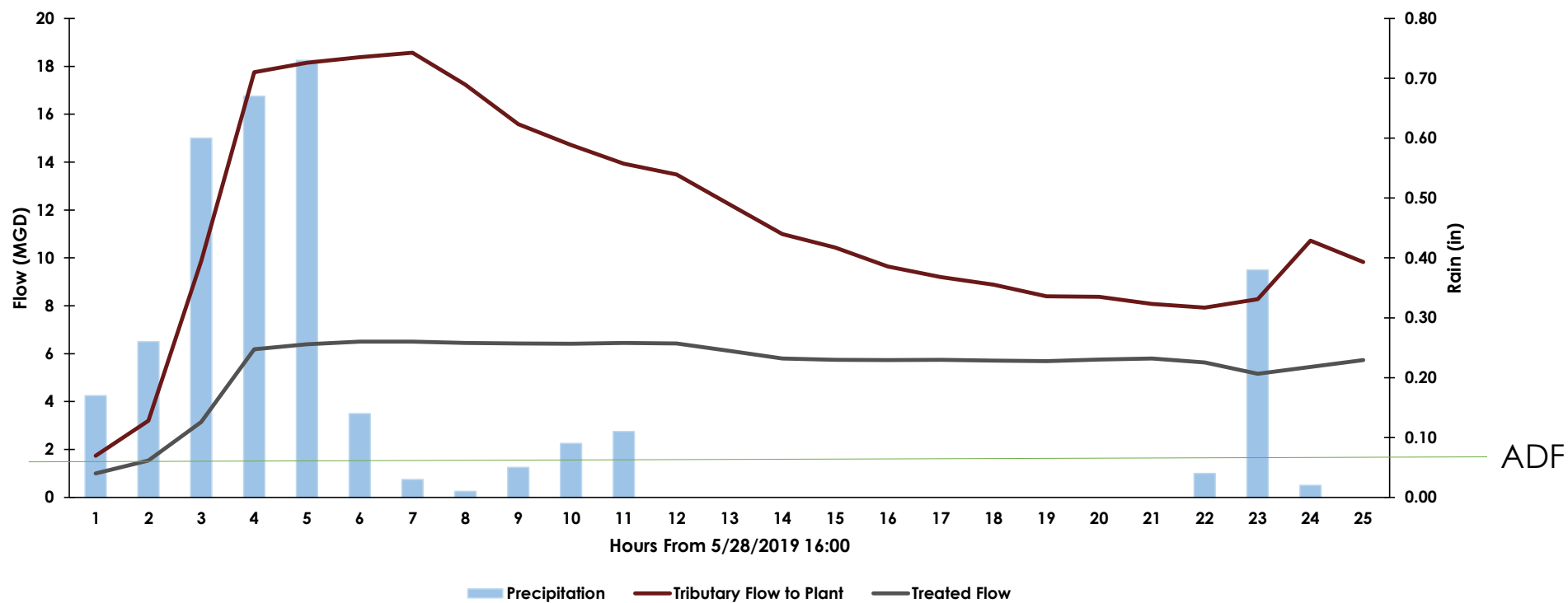
Overloaded Clarifier – Solids going over weirs



Chlorine Contact Tank – solids in tank

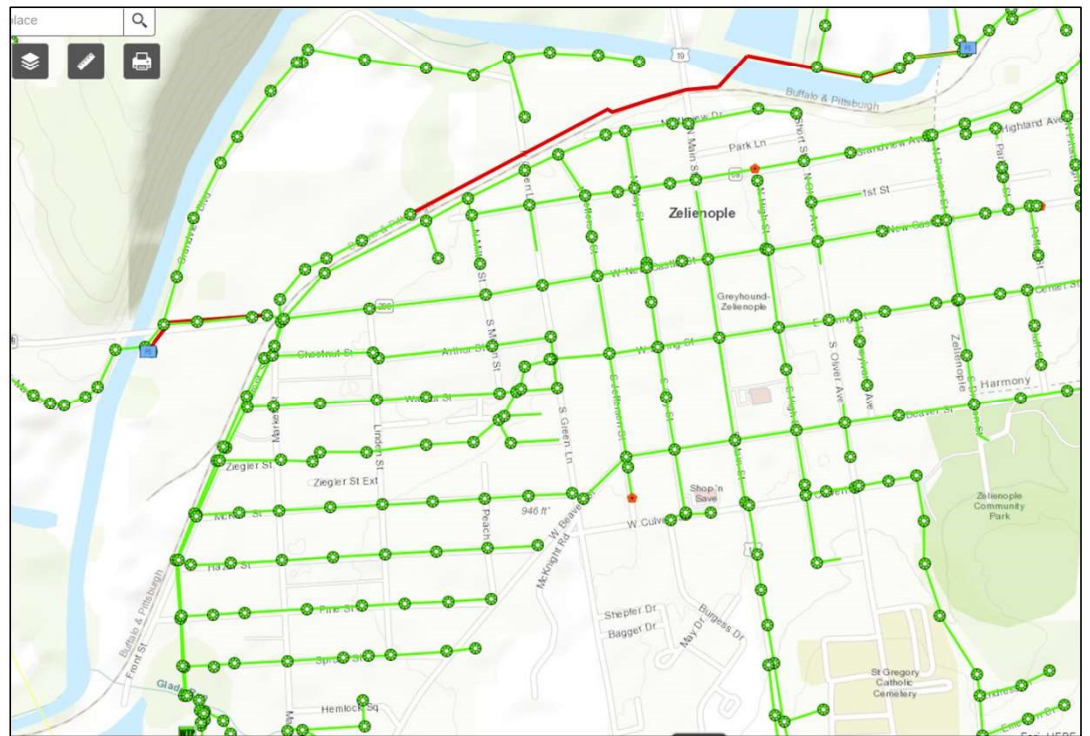


Historic Overflows and Study Results



Historic Overflows and Study Results

Peak flows beyond WPCP capacity greatly impacts customers in Zelenople as hydraulic limitations result in Front Street Interceptors and gravity line surcharges



Historic Overflows and Study Results

Top 5 locations contributing to rain derived inflow and infiltration (RDII)

Representative of modern construction methods

Flow Meter Isolation	Municipality	Average RDII/LF (gpd/LF)
Northwest Zelienople	Zelienople	23.48
North Harmony	Harmony	12.32
Southeast Zelienople	Zelienople	10.24
Northeast Zelienople	Zelienople	10.08
Harmony	Harmony	6.78
Seneca	Jackson	5.89
Halstead	Zelienople	5.43
Jackson Manor	Jackson	3.86
Glade Run	Jackson	3.84
Rosewood	Zelienople	3.81
Scholars Run	Jackson/Lancaster	3.22
Sysco	Jackson	2.77
Harmony Junction	Jackson	2.61
South Route 19	Jackson	1.87
Timberbrook	Zelienople	1.43
Tollgate	Jackson	1.09

Sources of Inflow and Infiltration

Surcharged Manhole - Roots



Cracked Manhole



Sources of Inflow and Infiltration

- > Truss Pipe
 - Popular in 1970's
 - Brittle
 - 40 year life expectancy



Sources of Inflow and Infiltration

- > Orangeburg Pipe
 - Pulled from private lateral
 - Popular between 1940 -1970
 - Brittle
 - 30 year life expectancy





Harmony Pump Station

Location and Description

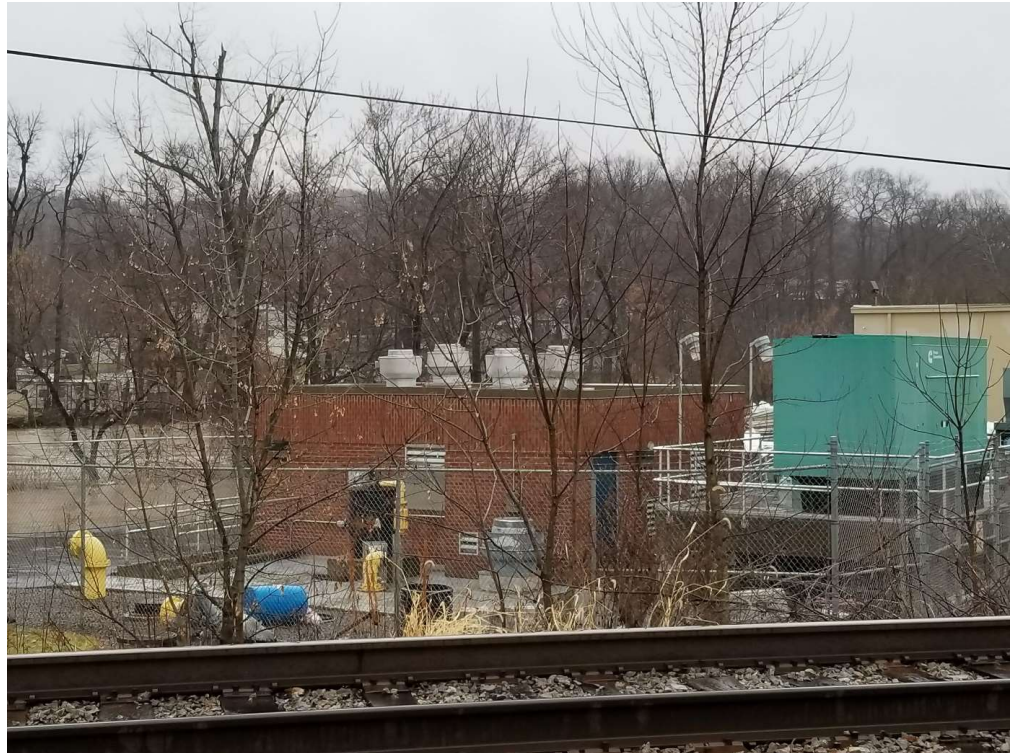
Hydraulic and Structural Deficiencies

Harmony Pump Station Infrastructure Improvements



Location and Description

- > Located in Harmony Borough
- > Original Harmony Borough treatment plant
- > Converted to PS in 1979
- > Services three municipalities
- > 3.17 mgd capacity



Hydraulic and Structural Deficiencies

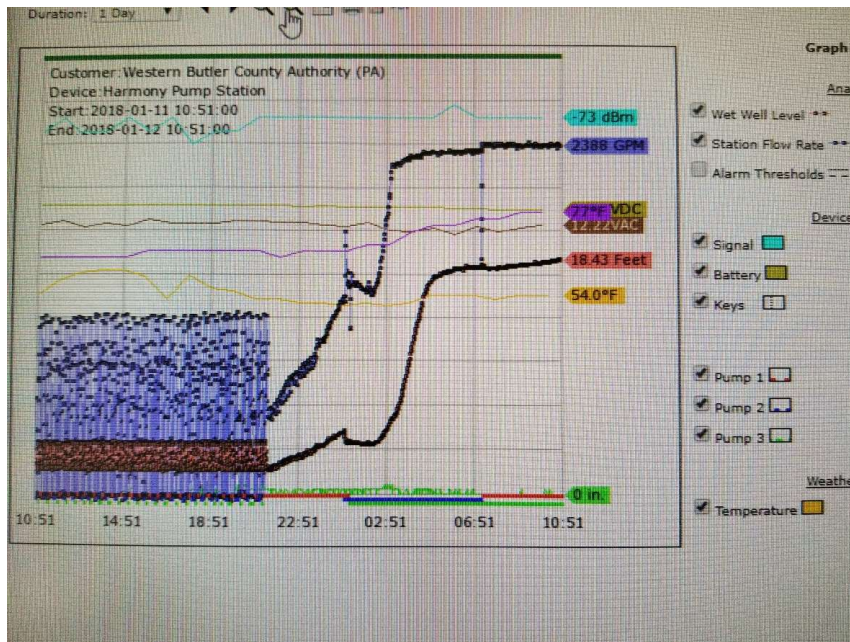
- > Significant inflow and infiltration
- > Deterioration
 - Wet well
 - Equipment
 - Roof
- > Undersized equipment
- > Undersized influent lines
 - Noncompliant 7 inch lines
 - Surcharging Scholars Run Interceptor during heavy rain events

Peak day flow per year

2015	2016	2017	2018	2019
2,920,027	2,117,142	2,322,554	3,458,582	3,204,893

Hydraulic and Structural Deficiencies

Harmony PS Flows Exceeding Capacity (3.43 MGD)



Flooded Harmony Pump Station



Hydraulic and Structural Deficiencies

**Scholars Run Interceptor Surcharge
(Indian Brave)**

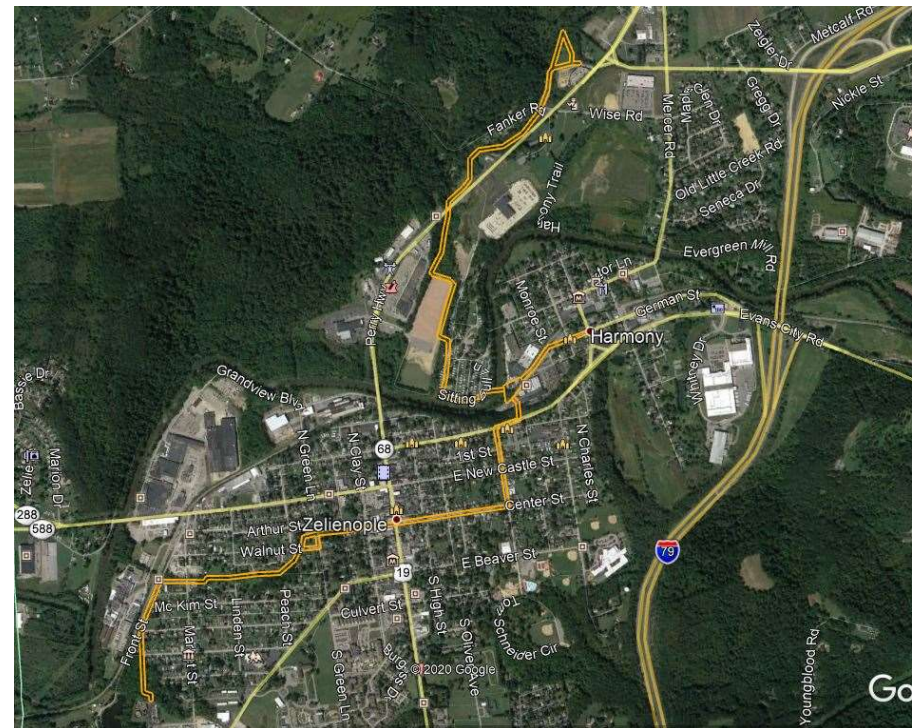


**Manhole Located in Stream
(Scholars Run Interceptor)**



Harmony Pump Station Infrastructure Improvements

- > Upgrades influent lines
- > Upgrades equipment and capacity
- > Upgrades downstream lines
- > Opinion of Probable Construction Cost \$10.6M
 - Easements
 - Design
 - Permitting
 - Construction





Existing WPCP

Location and Description
Hydraulic and Structural Deficiencies



WPCP Location and Description

- > Located in Zelienople Borough
- > Aged plant 1979
 - Some structures from 1930's
 - Additions in 1999
- > Services four municipalities
- > Existing plant design
 - 2.2 mgd ADF
 - 4.5 mgd PHF



WPCP Location and Description

- > Two digester tanks
- > Three aeration tanks
- > Three clarifier tanks
- > Sand filters
- > Chlorine contact tanks
- > Two excess flow tanks for peak flows



WPCP Deficiencies

- > Flows beyond 3.3 mgd - third aeration and clarifier
 - Manually operated
 - Labor intensive
 - Lacks quality treatment
 - Shallow tanks cause settling issues during high flows
 - Hydraulic and solid loading distribution
- > Flows beyond 4.5 mgd - excess flow pump station
 - Excess flow tank #1 has 0.6 MG capacity
 - Excess flow tank #2 has 0.03 MG capacity
 - Chlorinated and discharged into stream
- > Aging structures, equipment, and outdated treatment technologies

WPCP Deficiencies

Electrical (40 years)

- Cracking insulation
Full replacement
- Obsolete parts
(eBay)



WPCP Deficiencies

Clarifiers (40 years)

- Shallow design
- inefficient design
- Deteriorating sludge collectors (Significant maintenance and repair)



WPCP Deficiencies

Sand filters (40 years)

- Malfunctioning pumps and underdrains
- Inefficient
- Hydraulic limitations
- Needed due to inefficient clarifiers

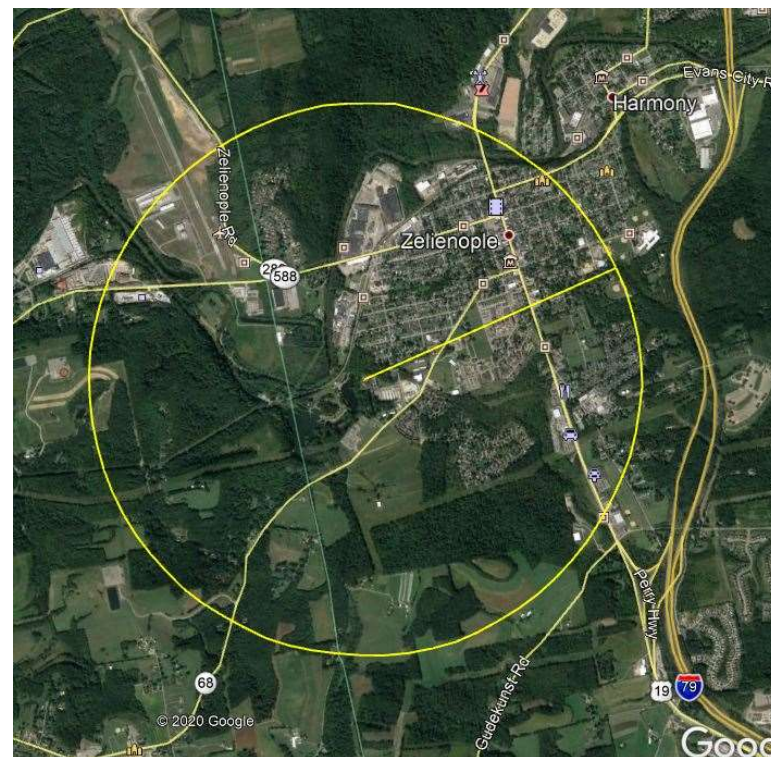
Blowers (20 years)

- Located below ground
 - Damaged during past floods
- Inefficient
 - common header between basins cause operational issues
 - Energy inefficient

WPCP Deficiencies

Chlorination System (40 years)

- > Antiquated
- > Minimum evacuation radius of 1.1 miles
 - > Weather conditions could increase community impact of failure



WPCP Deficiencies

Example of wear and tear at WPCP

- > Worn impellers vs new impellers





Alternatives Considered

I&I Reduction
Existing Plant Repair/Upgrades
Chosen WPCP Alternative



I&I Reduction

- > Current efforts include:
 - Realty transfer inspections
 - Smoke and dye testing
 - often don't successfully identify illegal connections
 - Relining gravity sewers
 - Raising tops of manholes located near streams
 - Installing water-tight lids

I&I Reduction

Does not address Harmony/WPCP equipment deficiencies

Time consuming and cost prohibitive

- > Additional flow studies
 - locate I&I and prioritize repairs
 - confirm I&I reduction or elimination
- > Private sewer repairs at owners expense (\$41M)
 - WBCA estimates approximately 80% of all customers would need repair/replacements
 - Approximately \$15,000 per private owner
 - Repairs beneath structures can be as much as \$30,000 per private owner
- > Public Gravity Sewer Repairs(\$66M)
 - Approximately \$300/ LF of pipe
 - 125,000 LF in Zelienople and Harmony
 - 95,000 LF in other high contributing areas
 - Route 68, 19, 228 impacts

Existing Plant Repair/Upgrades

- > DEP compliance issues
 - Poor quality effluent during peak flows
 - Consistent overflow events could trigger a corrective action plan
- > Would not address existing aging infrastructure
- > Additional process tankage
 - Constructability issues
 - Land availability
 - Disruptions to existing treatment
 - Interfering site conditions (yard piping)
 - Additional excess flow tanks not large enough to handle 18MGD peak flows
- > Projected developments would cease
 - Higher rate impact to existing customers

Chosen WPCP Alternative

- > Environmental Stewardship
 - Minimal chemical usage
 - High energy efficiency
 - Superior effluent quality
- > Addresses peak flows due to I&I
- > Low operating cost
- > Expandability
- > Raises equipment out of floodplain
- > Eliminates antiquated chlorine disinfection
- > Consideration for ongoing maintenance and replacements



Chosen WPCP Alternative

- > Building to be repurposed for sludge dewatering and storage
- > Aeration to be repurposed as sludge digestion tanks
- > Clarifiers to be repurposed as septage receiving for additional Revenue
- > Opinion of Probable Construction Cost \$64M
 - Design
 - Permitting
 - Construction





Customer Impact

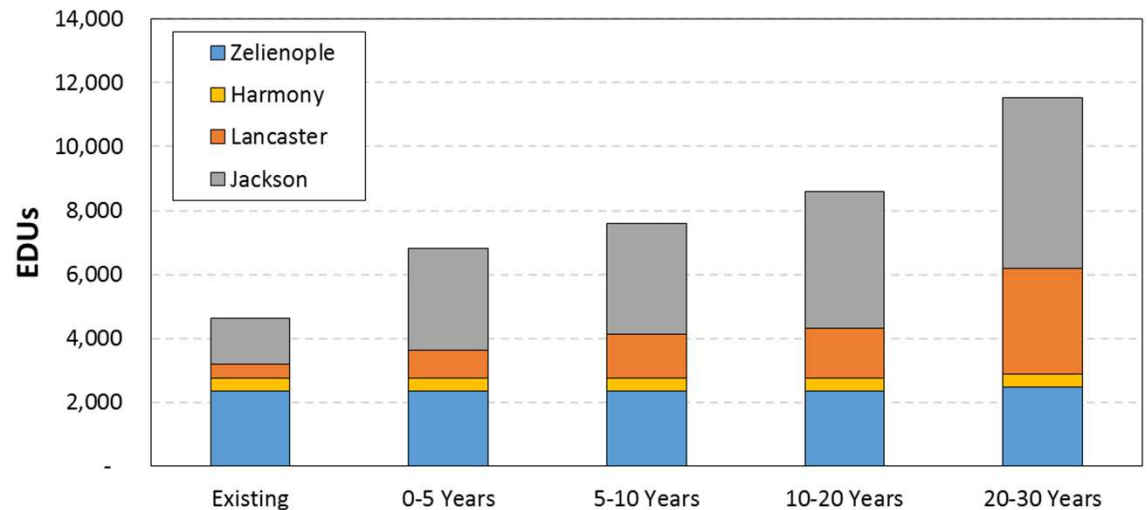
Projected Developments
Rate Increase Assumptions
Rate Increase



Projected Developments

- > Modern construction methods are watertight
- > 94 EDUs in Zelienople developments not included in Plan
- > Developments help fund capital improvement projects (i.e. Herman PS)
- > Tap in fees
 - \$5,400 per EDU
 - Projected \$34M in revenue

EDUs Identified in Act 537 Plan



Rate Increase Assumptions

Rate increase calculation used the following conservative assumptions:

> Revenue

- No grant funding
- 100% of 0-5 year projected developments
- 40% of 5-10 year projected developments
- 33% of 10-30 year projected developments

> Expenses

- Miscellaneous capital expenses of \$200,000 per year
- Higher loan interest rates
- Higher borrowing amount
- 15% operational cost increase as a result of the new WPCP

Rate Increase

- > 10 year loan pay back period for Harmony Pump Station Infrastructure Improvements Project
- > 30 year loan pay back period on WPCP Upgrade Project
- > The total 31.3% rate increase from 2020 to 2040 equates to a 1.4% increase per year over the 20-year period.

Year	Monthly Rate (\$/1,000 gallons)	Annual Increase	Cummulative Increase
2020	16.00	0.0%	0.0%
2021	16.50	3.1%	3.1%
2022	17.00	3.0%	6.3%
2023	17.50	2.9%	9.4%
2024	18.00	2.9%	12.5%
2025-2029	18.00	0.0%	12.5%
2030	19.00	5.6%	18.8%
2031-2034	19.00	0.0%	18.8%
2035	20.00	5.3%	25.0%
2036-2039	20.00	0.0%	25.0%
2040	21.00	5.0%	31.3%



Conclusion



Conclusion

- > Proposed projects (\$74.6M) address
 - Existing peak flows
 - Relocates equipment out of flood prone areas
 - Existing structural and equipment deficiencies
 - Reduces I&I contributions in some public sewers
 - Scholars Run Interceptor
 - East Front Street Interceptor
 - Reduces risk for basement backups
 - Accounts for projected developments
 - Alleviates cost impact to existing customers
- > I&I reduction efforts would exceed \$100M
 - Over 40% at private owners expense