Reported I&I (Inflow and Infiltration) issue at Colonial Ave.

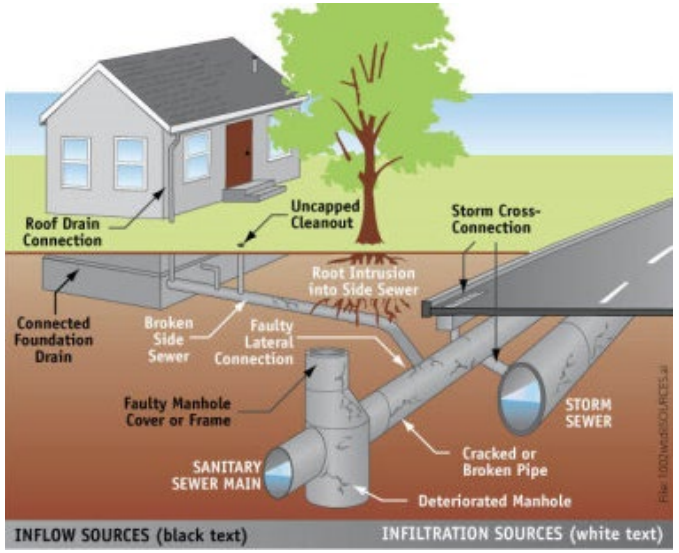
- Recent heavy rains created a visible I&I occurrence along Colonial Ave.
- During the incident, sanitary waste most likely originating from our adjacent sewer system was observed exfiltrating one of our manholes in the vicinity of Colonial & Washington intersection.
- Public Works immediately began to mitigate this issue
- DEQ was notified and Public Works is waiting on response.
- Preliminary assessments indicates a breach in both stormwater and sewage systems and mitigation activities have been initiated.
- Preliminary courses of action are being developed to submit to DEQ for concurrence and ultimate action

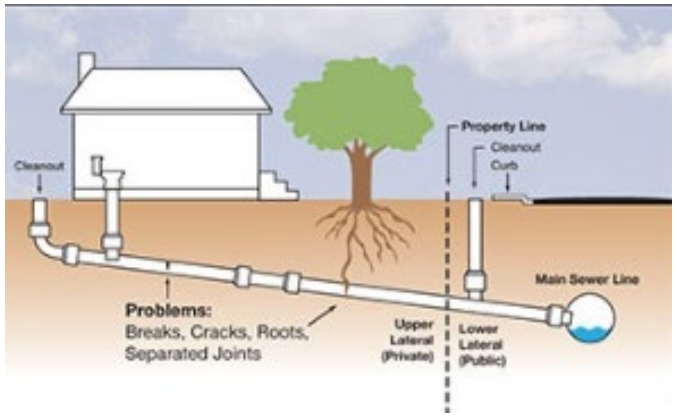
What is I&I (Inflow and Infiltration)

- **Infiltration/Inflow** (**I/I**) causes dilution in sewers. Dilution of sewage decreases the efficiency of treatment and may cause sewage volumes to exceed design capacity. Although inflow is technically different from infiltration, it may be difficult to determine which is causing dilution problems in inaccessible sewers. The EPA defines the term infiltration/inflow as combined contributions from both.

- **Infiltration:** Groundwater entering sanitary sewers through defective pipe joints and broken pipes is called *infiltration.* In general, volume of leakage will increase over time. Damaged and broken sewer cleanouts are a major cause of infiltration into municipal sewer systems. Infiltration will occur where local groundwater elevation is higher than the sewer pipe. Gravel bedding materials in sewer pipe trenches act as a French drain. Groundwater flows parallel to the sewer until it reaches the area of damaged pipe. In areas of low groundwater, sewage may exfiltrate into groundwater from a leaking sewer.

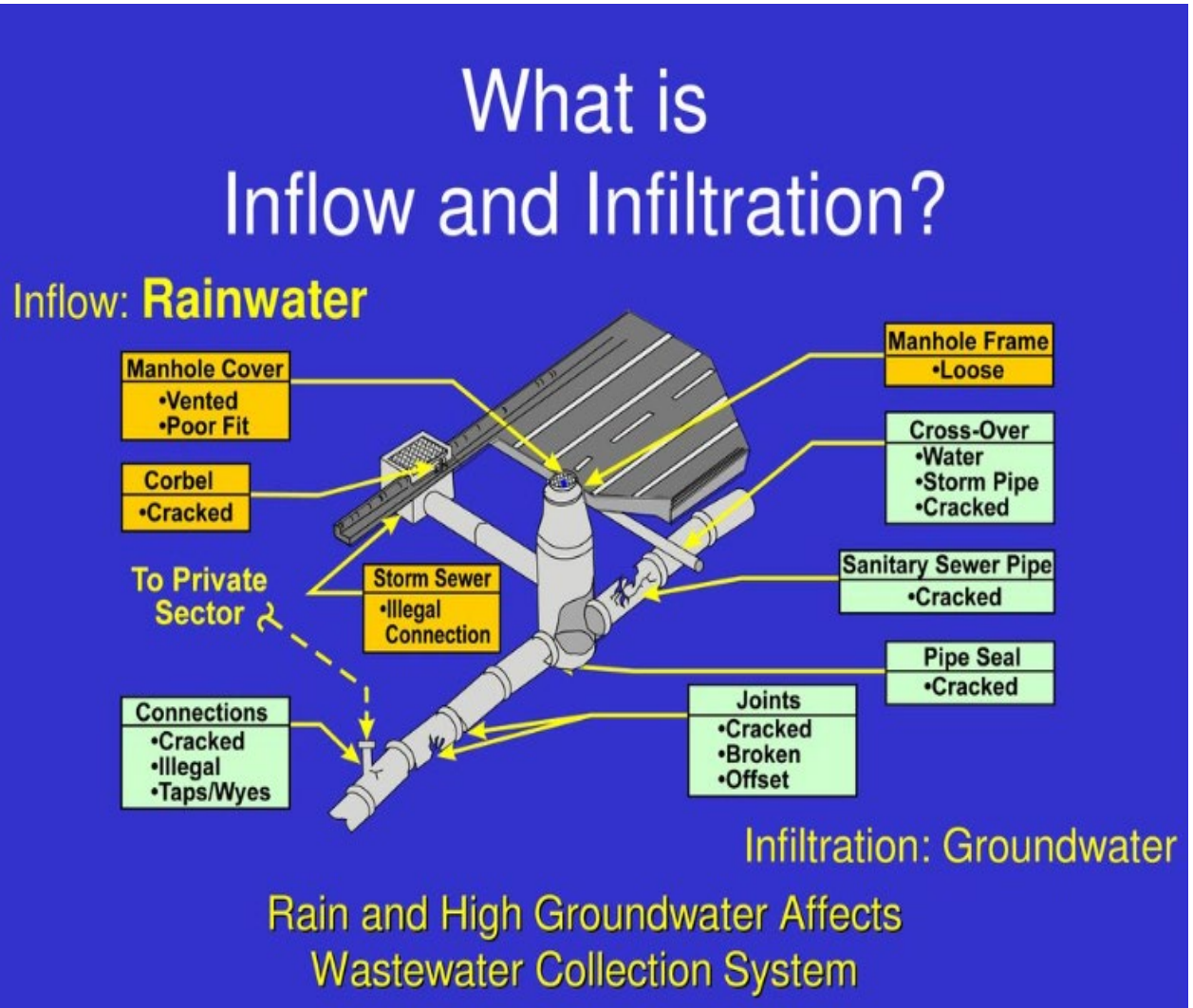
- **Inflow:** Water entering sanitary sewers from inappropriate connections is called *inflow.* Typical sources include sump pumps, roof drains, cellar drains, and yard drains where urban features prevent surface runoff, and storm drains are not conveniently accessible or identifiable. Inflow tends to peak during precipitation events and causes greater flow variation than infiltration. Peak flows caused by inflow may generate a foul flush of accumulated biofilm and sanitary solids scoured from the dry weather wetted perimeter of oversized sewers during peak flow turbulence.

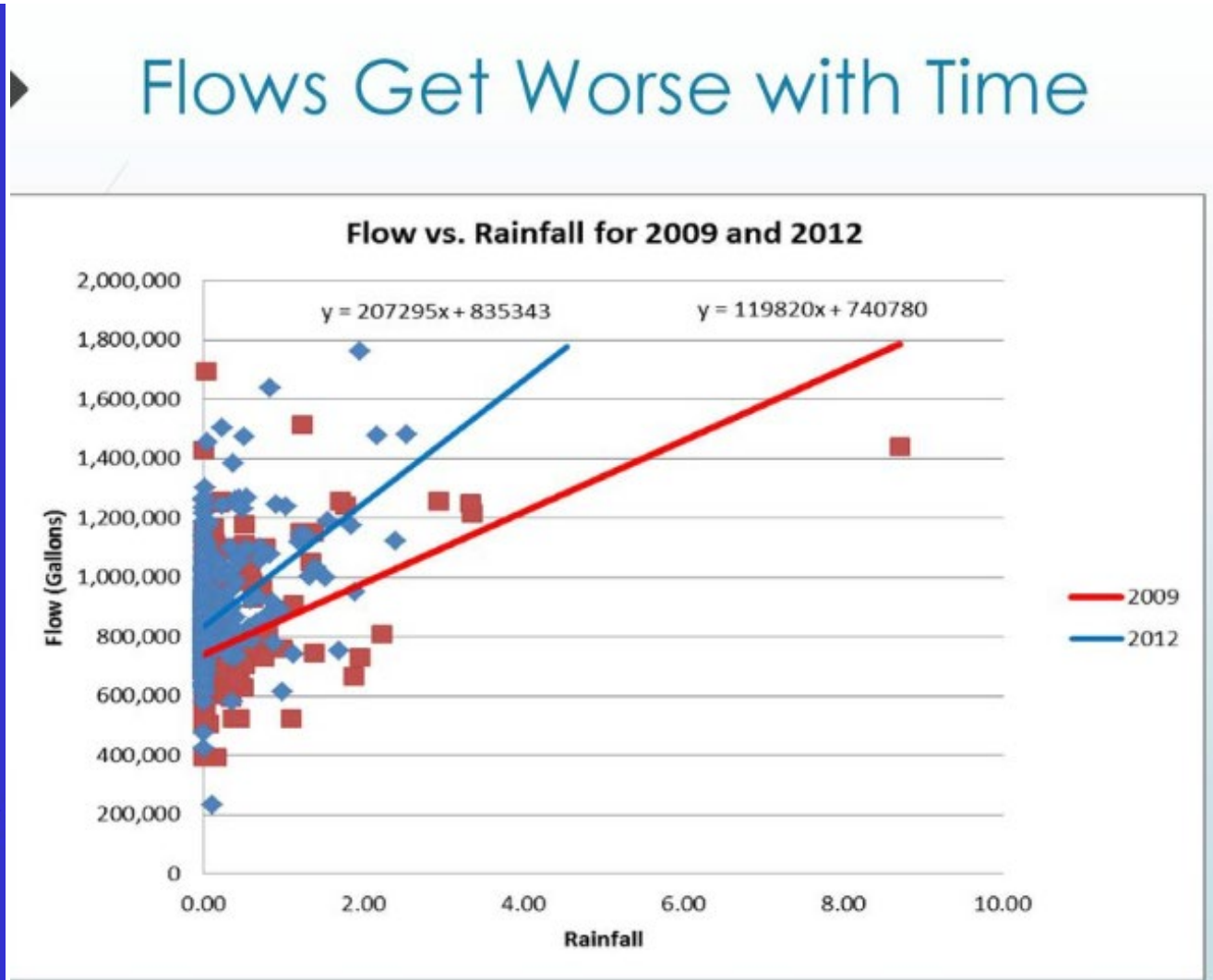




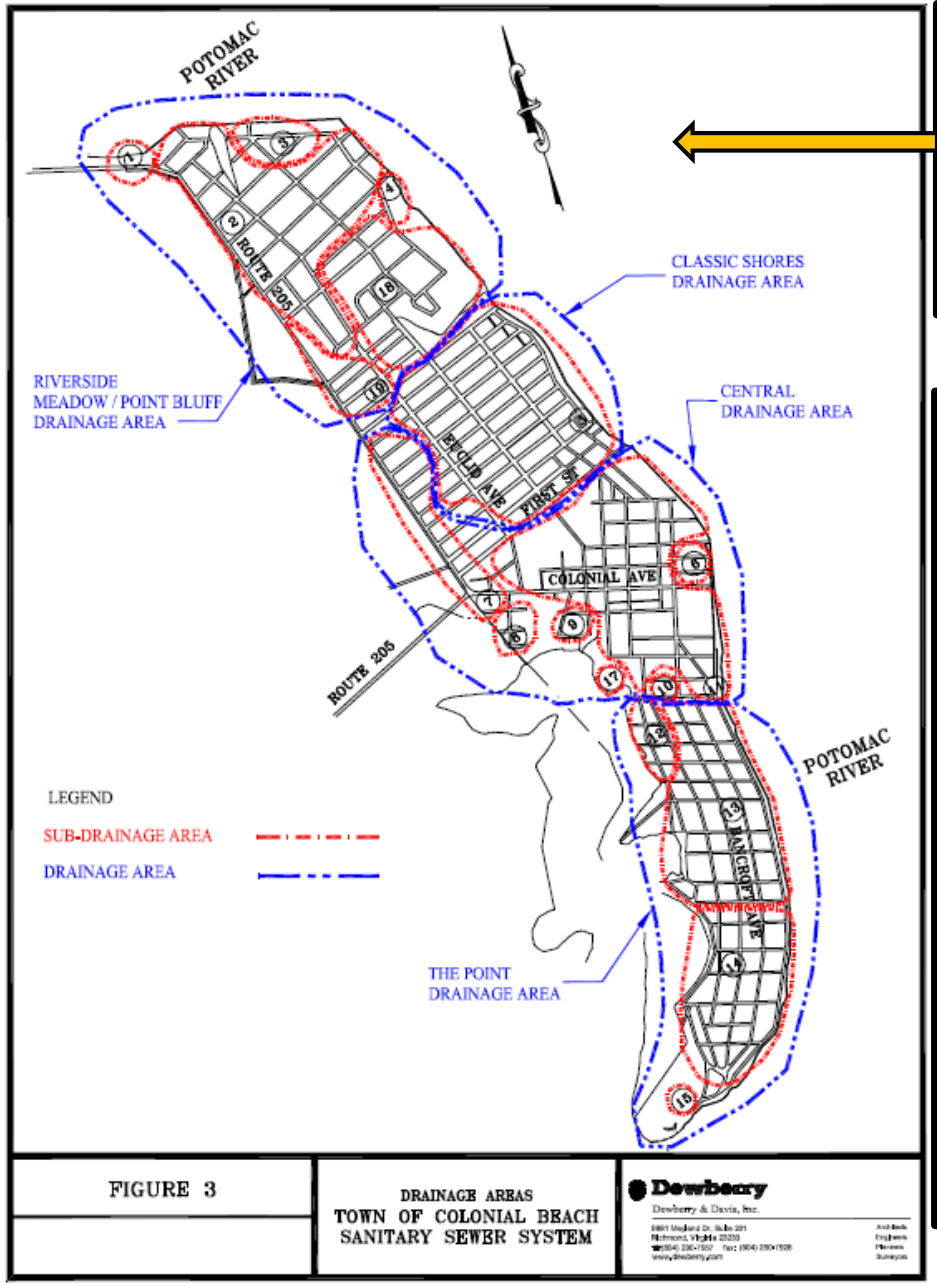
I&I and Infrastructure degradation over time

It is expected that all municipal systems have I&I. Infrastructure naturally degrades over time and minimizing the I&I is considered an enduring task throughout the industry.
For example: Colonial Beach WWTP can quadruple its sewage intake when severe weather occurs.





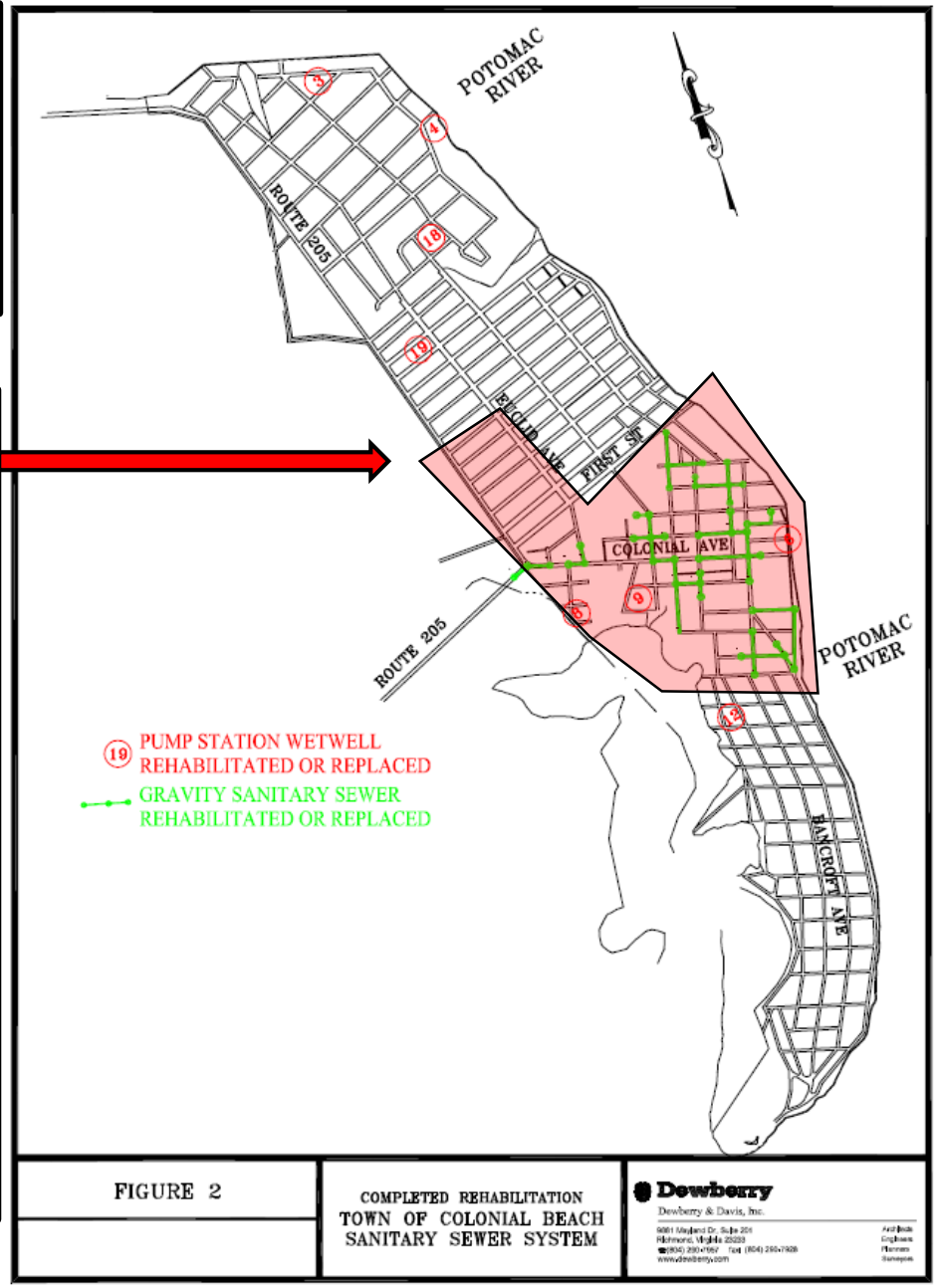
Current I&I Impact Zone



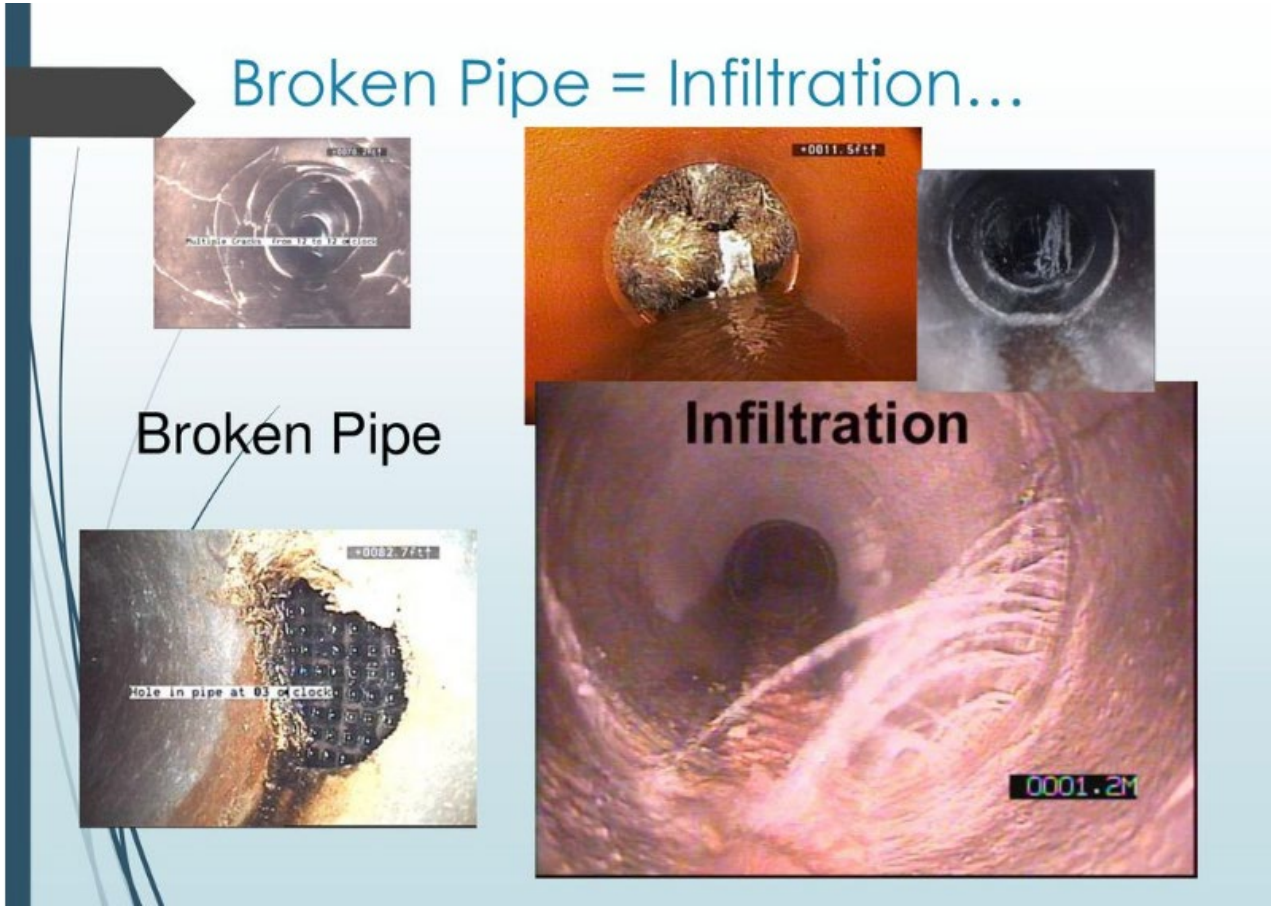
A 2004 Dewberry assessment of our drainage systems illustrates that we have multiple "drainage areas" that affect our infrastructure.

The manhole leakage (Colonial & Washington) is apart of the highlighted red portion of the system

- The Green lines indicate repair and replacement work previously remedied
- Notice that not all lines were addressed in 2004
- Initial assessments include revisiting the initial plan with focus on the non-replaced pipes



Anticipated I&I Discoveries and Cost scope



- The above pictures represent the type of challenges towns face when identifying I&I.
- The cost of replacing one linear foot of pipe is estimated at $35.00, larger “artery” type pipe is $170 for planning purposes
- We roughly have 25 miles of sewer line in Colonial Beach (132,000 linear feet).
- Public works replacement Cleanouts designed to support residences cost roughly $2,125.00. We currently have over 2500 residents.

I&I mitigation within the last 7 years

- Public Works completed a sewer project in 2013-14 that possessed a scope of $3,236,884.00
  - This project replaced pipe and asphalt of roughly 2.3 miles

- The annual budget spent of sewer operations is $500,000.00 This doesn't include WWTP which is 1.4 million

- Ditch reclamation project spanning two years in multiple drainage areas

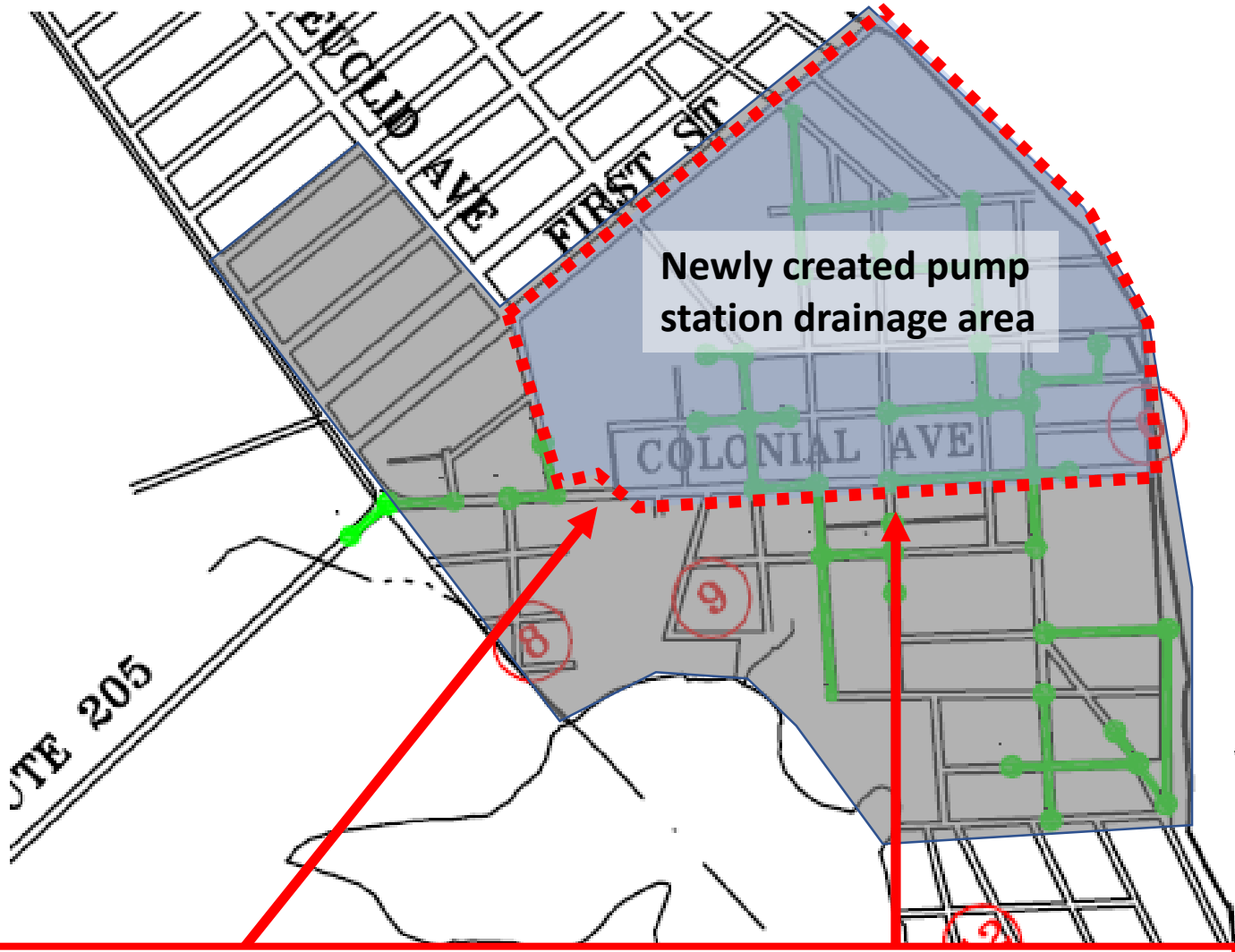
- Public Works roughly devotes 40% of their utility system manpower to sewer operations & maintenance functions:

  - Backup generator maintenance
  - Pump Station/Lift station operations, repairs and maintenance
  - Clearing sewer mains and laterals
  - New connection installations
  - Defective lateral replacement operations
  - Cleanout replacements as identified
  - I&I identification during severe weather events

Prior to the water & sewer rate increase of Fiscal Year 2019, operations were running at a loss and were unable to support any projects of magnitude

I&I The Way Ahead (non-emergency)

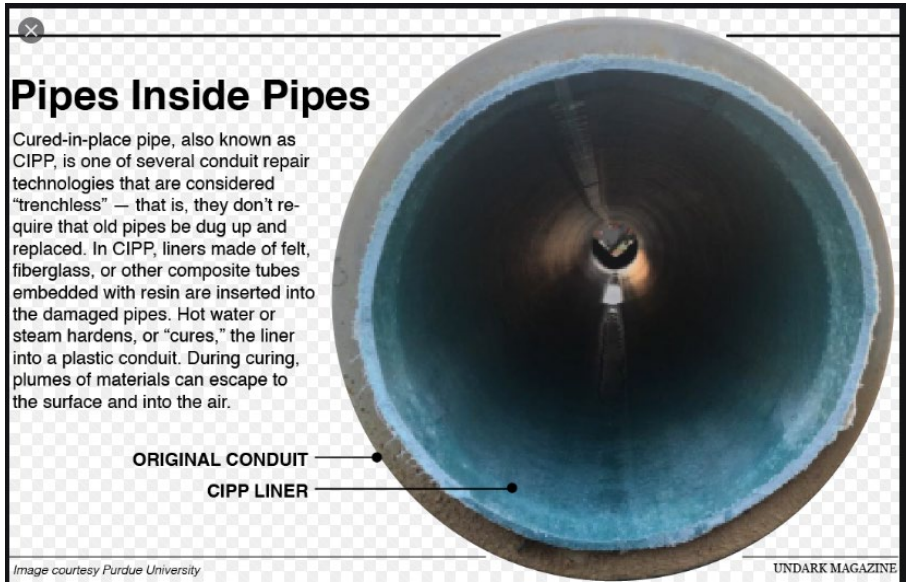
- Coordinate with DEQ regarding immediate courses of action and long-range plan of action (currently performing)
- Identify Funding sources: Internal and external (currently performing)
- Develop (with outsourced engineered analysis/review) a plan of I&I remediation focusing on the primary impact areas with order of priorities. (early stages of implementation with Dewberry)
- Coordinate engineered design efforts with funding sources to optimize external funding. (to be performed in approximately 1-3 months)
- Collaborate with state agencies to ensure course of action if acceptable (estimated timeframe: 3-6 months)
- Begin execution of recommended course of action and align emergency remediation efforts into the I&I mitigation plan. (12 months)

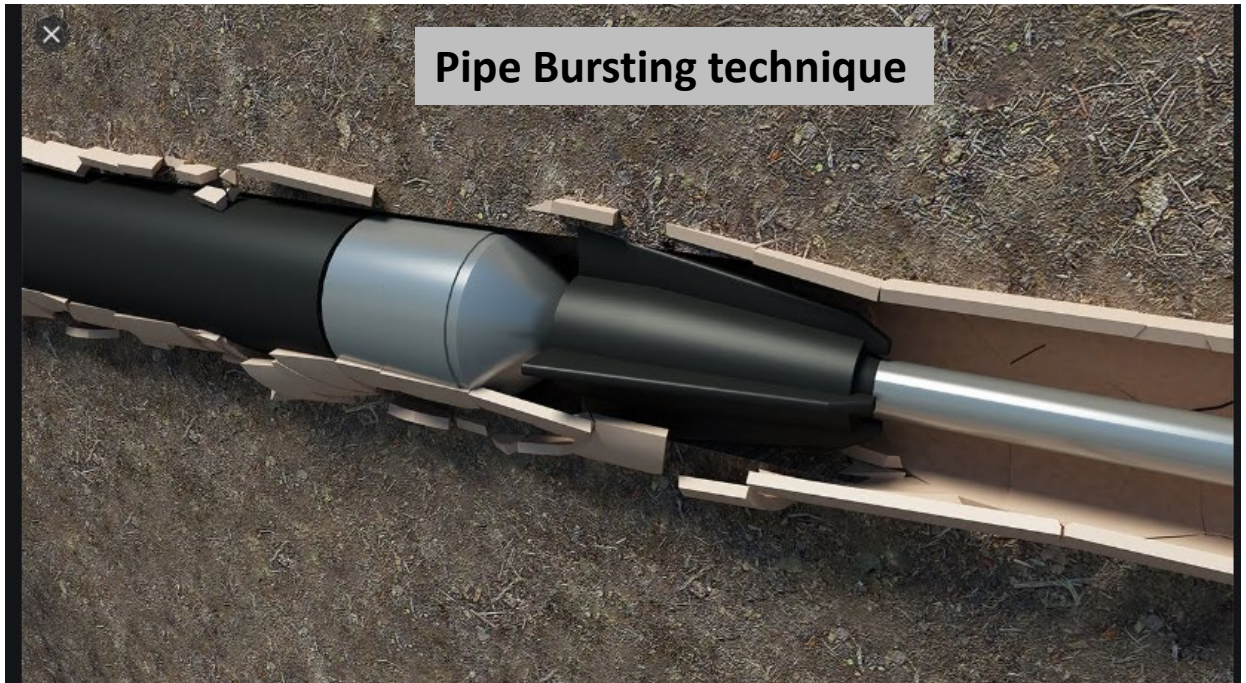


We preliminarily propose to DEQ that the above area in dashed red will be separated from the original grey drainage area and supported by an additional pump station. This will cut capacity constraints by 50% and provide the remaining grey area will support future growth initiatives.

Funding The Way Ahead

- Fiscal Year 2019 water and sewer rate increases have increased our unallocated sewer funds to $526k
- These unallocated funds are designed to support utility CIP initiatives we are discussing.
- By being fiscally responsible with accurate water and sewer rates, we now can begin allocating moneys without additionally burdening the taxpayer.
- Grants are currently being researched to identify any additional (non-Colonial Beach money) that can supplement the cost
- State agencies are being engaged to ensure that preliminary courses of action(s) satisfy all regulatory constraints and limitations.
- Procurement processes are being reviewed by Auditors to ensure that acquisition processes are followed (with the possibility of emergency procurement activities) to ensure expediated remediation.





Questions and Comments