RISE
Resilience Innovations

# 2021 COASTAL COMMUNITY RESILIENCE CHALLENGE
# FLOOD MANAGEMENT

## FM 2: Stormwater Debris & Litter Control

### The Stormwater Debris & Litter Control Problems

Maintaining efficient flow in sewer and stormwater infrastructure in daily operations means that system has more capacity to absorb high flows from extreme precipitation, storm surges, and sea level rise. In stormwater systems, lack of capacity results in surface flooding and drainage issues. In sewer systems, the result is combined/sanitary sewer overflows (a public health and environmental risk) and sewer backups into homes. Clogs and blockages cause reduced capacity in stormwater and sewer systems.

Consequences of clogged pipes are also more severe, as extreme rainfall and storm surges overwhelm clogged systems even faster. At the most basic level, clogs are caused by leaves, roots, sediment, and trash that enter stormwater systems. As accumulation happens, flow slows, water levels rise, and backups and flooding occur. At a structural level, stormwater systems typically flow by gravity, and many coastal communities such as Hampton Roads are on flat topography to begin with. Sea level rise causes submersion of outfalls (which hinders gravity flow), higher groundwater tables (increasing sewer infiltration and decreasing soil absorption capacity), and salt damage to pipes.

Stormwater and sewer operations and maintenance (O&M) is crucial to maintaining performance of existing systems. Traditionally, stormwater O&M has consisted of manual tasks such as street sweeping, visual inspections of catch basins and other assets, and line inspections; in sewers, manual CCTV video inspection is standard. However, these methods are time- and resource-intensive, and city budgets are in a precarious situation in 2020 and beyond. O&M is even more critical in aging stormwater infrastructure as well. Sewer pipes can start exhibiting clogging after 30-40 years, and pipes become cracked, misaligned, and otherwise deteriorated over time.

### The Pain Points in Current Solutions

For many cities, it is too expensive and time consuming to regularly clean litter and debris out of all street level catchment basins on a regular preventative basis. Some installations use a vortex hydrodynamic separator to separate litter and sediment from the water which are subsequently vacuumed out. These are expensive to procure and install and are not always practical to install in an urban environment. Litter and debris can therefore get into the stormwater system causing blockages or is deposited into the nearby waterways.

Backups due to stormwater blockages can cause significant flooding damage. Regular cleaning by crews using vacuum trucks can help prevent this but it is too costly and time consuming to keep all the stormwater system clean. Stormwater blockage detection is currently mainly complaint driven when streets and sidewalks begin to flood. The City doesn't get advance identification and warnings of blockages and reacts when the street-level flooding occurs.

Some causes of stormwater drainage problems:

- Litter and debris can accumulate in storm drains and catch basins leading to flooding at the street level.
- Litter and debris can accumulate in the stormwater drainage pipes leading to stormwater backup and flooding at the street level.
- Litter and debris that makes it through the stormwater system are expelled into nearby waterways causing pollution and eyesores.

The problem is exacerbated by the fact that older drainage systems are not sized to manage the stormwater loads seen today.

## Solutions Being Sought

RISE is seeking solutions to the litter and debris problem that:

- Reduce labor costs and do not require manual maintenance on a regular basis.
- Provide stormwater managers predictive knowledge of stormwater blockages to allow preventative actions by the city.
- Novel solutions to capture debris and litter at the street level and/or at the outfall

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