

AQUALIS

Mitigating Property & Parking Lot Flooding

Stormwater Awareness Week





Meet Your Expert

- Certified Stormwater SCM Inspection & Maintenance Professional
- As AQUALIS's marketing lead for education content, I turn complex stormwater requirements into practical guidance for property teams; authoring resources on U.S. sewer systems and seasonal flooding readiness used by facility and portfolio managers. I also engage with various industry networks across multiple states to deliver webinars and outreach that strengthen flooding resilience and compliance.
- AQUALIS has over 20 years of experience in managing water resources that can be applied to construction and post-construction activities.
- With services ranging from comprehensive stormwater and lift station management, CCTV underground pipe inspections, vector and jetting services and hydro excavation applications, the AQUALIS team is expertly skilled to provide professional and holistic services to all projects across the United States.



Presenter:
Carlie Utesch, Marketing



Learning Objectives



Review responsibilities implemented by the Clean Water Act and recognize regulations across the nation on the local, regional and national levels.



Understand different stormwater components that assist in managing stormwater runoff on impervious surfaces like parking lots.



Assess real-life case studies where property flooding impacted businesses from poorly maintained stormwater systems.



Evaluate the preventative measures that can be taken to ensure proper function of stormwater assets to reduce flooding and property damage.



Why is Stormwater Management Important?

Why is Stormwater Important?





Defining Our Terms



A Stormwater **Best Management Practice (BMP)** or **Stormwater Control Measure (SCM)** is a technique, measure or structural control that is utilized to manage the quantity and improve the quality of stormwater runoff.' SCM's are designed to maintain or improve the pre-developed conditions for water quality and quantity downstream of a property.

Best Management Practice (BMP) = Stormwater Control Measure (SCM)



Types of Engineered BMPs and SCMs

- Bioretention/rain gardens
- Sand filters
- Constructed wetlands
- Wet detention basin
- Dry detention basin
- Grassed Swale
- Infiltration Basin
- Permeable pavement
- Level spreader
- Proprietary systems / manufactured BMPs





- **2000 – Phase II of the Clean Water Act**
 - Under the CWA, urban stormwater runoff is identified as a contributor to water pollution in the US
 - EPA pushes these regulations down to the State and Municipal levels to enforce
 - Requires an NPDES (National Pollutant Discharge Elimination System) Permit for any land disturbance of 1 acre or more
 - MS4s must adhere to standard minimums to remain in compliance
 - Proper maintenance of SCMs fall under this law
 - Expensive fines and negative publicity a consequence for noncompliance



Why Stormwater Control Measures (SCMs)?

SCMs are designed to control Quality and Quantity of post-construction stormwater runoff



Water Quality



Water Quantity



Importance of Water Quality

Stormwater systems can treat runoff that may be contaminated with pollutants that are collected from impermeable surfaces

- Impacts on living organisms, mosquitos, dissolved oxygen levels, pH level
- Weeds, algae blooms, dissolved oxygen levels
- Increases turbidity, carries nutrients, wildlife health, prevents sunlight penetration
- Toxic, long-lasting, aquatic deformities and mortality
- Illness in wildlife populations and local communities
- Toxic, long-lasting, bioaccumulation

-  Trash/ Debris
-  Nutrients
-  Sediment
-  Heavy Metals
-  Bacteria
-  Chemicals

TYPES OF POLLUTANTS



Importance of Water Quantity

Stormwater systems manage runoff caused by the development of impervious surfaces

- Pooling in parking lots, flooding of private and public property, increase in local waterway levels
- Destabilization of stream channels, damage to aquatic habitat
- Prevents aquifer recharge, infiltration reduction
- Soil destabilization, sinkholes, migrating stream banks
- Combined sewer overflows, release of untreated waste

-  Flooding
-  Waterway Health
-  Groundwater Reduction
-  Erosion
-  Sewer Overflows

IMPACTS OF RUNOFF



Responsibilities of Property Owners



Inspections

- Notice of Termination
- Annual inspections
- Regulated by the city or municipality on documentation and submittal
- May require certification by a professional engineer or other qualified personnel



O&M Agreements

- Maintenance schedule
- Inspection requirements
- Frequency of inspections (typically yearly)
- Easements or covenants for maintenance
- Description of maintenance activities

WHAT IS A NOTICE OF VIOLATION?

- **Notices of Violation (NOV) is an official notification to inform a non-compliant property owner/ manager of a violation in relation to stormwater management**
 - Notice will detail when and where observed on the property
 - May include fines and penalties
 - Fines are outlined in the NOV documentation
 - Ignorance of environmental laws is not an excuse for non-compliance.
- **Reminder of the basics of Stormwater Management**
 - Systems are designed to manage rainfall
 - This system is agreed to and approved by a regulatory body
 - Site or system should be inspected/ maintained at a minimum annually or at the requisite frequency per the regulatory agency or O&M agreement

CITY OF METROPOLIS STORMWATER DEPARTMENT

February 19, 2014

Big Box Incorporated
123 Fake St
Metropolis, NY 38719

RE: **Detention Pond Maintenance:**

Dear Property Manager,

An inspection was made of your property at 123 Fake Street, Metropolis NY 38719 and it was determined to be in violation of the City of Metropolis Stormwater Ordinance section 27-612 regarding maintenance of stormwater facilities. The City of Metropolis is required to make routine inspections of stormwater facilities to identify deficiencies. When ponds are not maintained they may fail and adversely impact downstream properties and/or waters of the State.

Our inspector found the following deficiencies during inspection:

- *Overgrowth of vegetation near inlet pipe*
- *Debris within pond*
- *Vines growing on perimeter fence*

A follow up inspection will be made in 30 days to re-inspect the facility. If attempts to address the maintenance have not started within 30 days, the City of Metropolis will proceed with enforcement. **If you have any questions or feel there has been an error please call 555-555-9312.** Thank you for your cooperation in this matter.

Sincerely,



John Smith, Operations Management Supervisor
Water Resources Department
Stormwater Management Division



Types of Notices of Violation

- **During Construction –**
 - Failure to apply for NPDES permit coverage
 - Failure to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP)
 - Inadequate SWPPP or BMPs
 - Exceedance of permit effluent limits
- **After Construction –**
 - Failure to implement appropriate Stormwater Control Measures (SCMs)
 - Failure to maintain or repair SCMs
 - Failure to conduct or document inspections
 - Illegal dumping/ discharge
 - Illicit connection (connecting a sanitary sewage system into a stormwater system)





Mitigating Flooding with SCMs

Exploring Assets on Your Property

Anatomy of a Parking Lot

- 1 Catch Basin
- 2 Permeable Pavement
- 3 Retention Pond
- 4 Underground Systems





Catch Basins

- Stormwater asset used to capture stormwater runoff from impermeable surfaces
- Various designs
 - Curb inlet
 - Drop inlet
- Typically found in parking lots and along roadways
- Grates are used to capture large debris
 - Runoff is then directed to a drainage pipe





When Catch Basins Fail

Common Deficiencies

- Brick and mortar deterioration
- Sinkholes
- Sediment build-up
- Ground separation and cracking

Flooding

- Sediment and trash accumulation
- Blockage further in drain system
- Heavy rainfall

Preventative Maintenance

- Visual inspection
- Sediment measurement
- Trash and debris removal
- Documentation of any deficiencies for monitoring

Corrective Maintenance

- Vactor
- Jetting
- Underground CCTV pipe inspections
- Extensive trash removal
- Repairs to the structure



Permeable Pavement

- Paved surfaces that reduce runoff with infiltration
 - Porous asphalt
 - Pervious concrete
 - Interlocking pavers
 - Plastic grid pavers
- Quality and quantity treatment
 - Removes pollutants
 - Infiltration to reduce quantity – draw down dependent on manufacturer guidelines and site conditions
- Beneficial in urban developments and retrofits



When Permeable Pavement Fails

Common Deficiencies



Flooding

- Sediment

Preventative Maintenance

- Visual inspection
- Percolation testing
- Routine industrial vacuum
- Spot aggregate material replacement
- Maintenance documentation and record keeping

Corrective Maintenance

- Deep cleaning with industrial vacuum
- Aggregate material replacement in large scale
- Paver replacements if damaged



Retention and Detention Ponds

- **Pond function and design**
 - Retention Pond – designed to always hold a permanent volume of water
 - Detention Pond – designed to hold a temporary volume of water during and immediately after a rain event
- **Benefits of ponds**
 - Flood prevention and management
 - Improves water quality
 - Aesthetically pleasing
 - Minimizes downstream erosion
 - Part of a stormwater treatment train
 - Runoff drained from catch basins or inlet





When Retention and Detention Ponds Fail

Common Deficiencies

- Vegetation overgrowth
- Nuisance vegetation
- Sinkholes
- Erosion

Flooding

- Sediment accumulation
- Trash accumulation
- Debris or clogs in outlet structures
- Failure to maintain structures
- Collapsed pipes
- Blockage in pond backing up to catch basins
- Heavy rainfall

Preventative Maintenance

- Vegetation management
- Monitor sediment in forebay or basin
- Remove trash and debris
- Monitor water levels after rain storms for proper drainage
- Assess animal activity

Corrective Maintenance

- Excessive vegetation removal
- Slope stability
- Clogged or damaged pipes
- CCTV underground inspections for proper diagnosis



Underground Systems

- Pipes, vaults, weir boxes, used to move water or store water for further treatment of stormwater runoff
 - Large piped systems slow down and hold stormwater runoff, commonly paired with proprietary devices
 - Underground SCMs filter, settle out and separate stormwater pollutants that may be present
- Installed beneath parking lots, streets and open spaces
- Proprietary devices used to treat water quality and quantity
- Optimize property usage





When Underground Systems Fail

Common Deficiencies

- Sinkholes
- Erosion
- Joint fractures
- Fractures
- Blown out slopes

Flooding

- Improper maintenance
- Clogged drains
- Water bypass
- Damaged pipes
- Sedimentation accumulation
- Trash and debris blockages

Preventative Maintenance

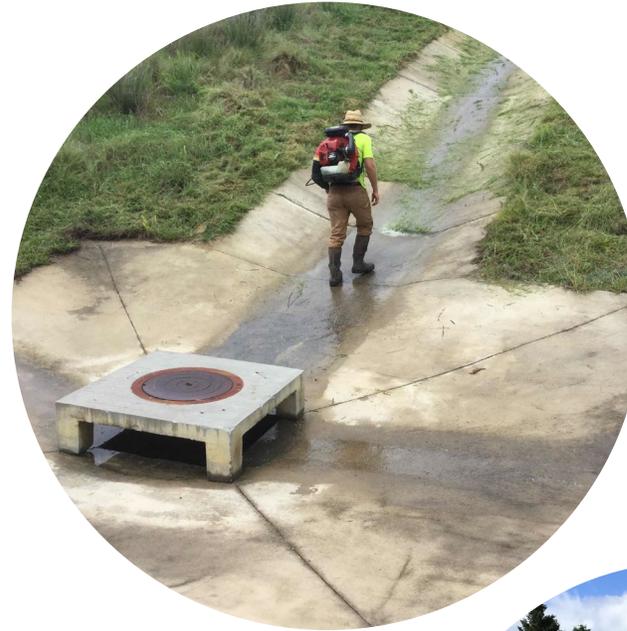
- Sedimentation measurement
- Visual inspection
- Removal of floatable, trash and debris
- Proprietary device inspection and cleaning

Corrective Maintenance

- Vactor
- Jetting
- CCTV underground pipe inspections
- Proprietary filter replacement
- Repairs and rehabilitation

Run-to-fail Method

- **Out of sight, out of mind mentality**
 - Tucked back behind buildings
 - Hidden in parking lots
 - Vegetated
- **Lack of awareness of systems –**
 - Poorly maintained stormwater assets due to turnover in positions
 - Deficient knowledge of regulations
 - Costly repairs required to get system back to designed function
 - Expensive fines enforced for failing compliance measures
 - Lacking proper budget allocation to maintenance instead focusing on emergency response, rehab, and repairs.





Case Studies



Case Study – Damaged Permeable Pavement

Case Study

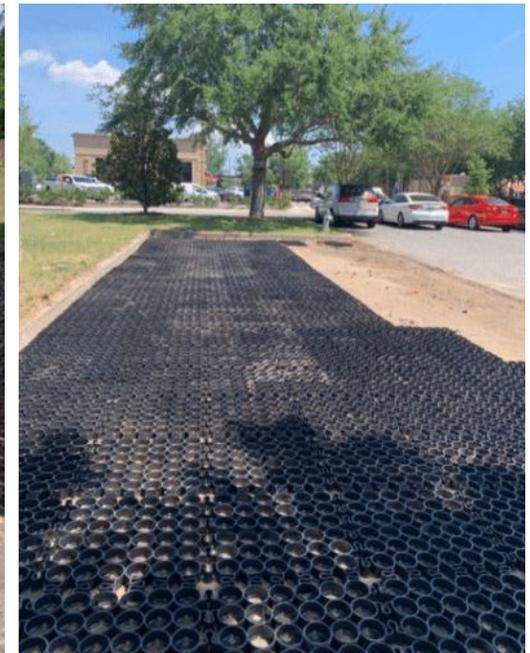
Mt. Dora, FL | Permeable Pavement Repair

Problem

- Improper drainage was documented during an inspection visit
- Clogs and damages were noted throughout the permeable pavement
- Exposed and broken sod grid was preventing proper water flow

Solution

- Excavate and remove all damaged portions of the sod grid
- Replace reinforced sod grid and super spots
- Reseed and restore pervious pavement function





Case Study – Be a Good Neighbor

Case Study

Dallas, TX | Catch Basin Maintenance

Problem

- Site was reported to drain slowly after rain events
- Inspection revealed the nearby catch basin collects large amounts of trash
- Accumulation leads to drain clogging

Solution

- Determined a substantial amount of trash is carried from the neighboring property into the catch basin
- Excavate and hand shovel the catch basin
- Stabilize eroded areas and regrade as needed
- Install silt fence to prevent large trash and debris from traveling across property lines to minimize future accumulation





About AQUALIS

AQUALIS

AQUALIS: The Nationwide Leader in Sustainable Water Management Services

Sustainable Water Engineering

- Flood Management
- Integrated Site Design
- SWMP Recertification and SWMPMA Certification
- Grant Assistance
- Credits

Stormwater Management

- Maintenance
 - Above and Below Ground
- Repair and Rehabilitation
- Inspections
- Industrial Compliance
- Construction
- Consulting

Hydro Excavation

Industrial Vacuumation and Jetting

CCTV Pipe Inspection

Water Quality Testing

Emergency Response

Lift Station Management

- Preventative Maintenance
- Repairs
- Inspections

Wastewater Management

- System Inspections
- System Cleanings
- System Repairs



Comprehensive Stormwater, Lift Station & Support Service Capabilities

30,000 + Yearly Maintenance & Inspection Visits

6,200+ Yearly Repair & Retrofit Services

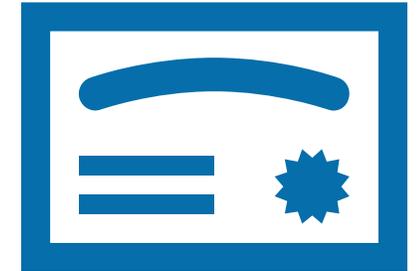
Service 49 States + Puerto Rico

13 Regional Branches

5,700+ Locations Serviced

Extensive Certifications For Expert Services

- CESSWI
- CPESC
- Commercial Aquatic Pesticide Applicator
- Clemson Post-Construction BMP Inspector
- Stormwater Erosion and Sedimentation Control Inspector
- Qualified Florida Construction Stormwater Inspector
- Commercial Turf, Ornamental, Right of Way Applicator
- FAA Certified Remote Pilot and Commercial Operator
- Certified Muffin Monster Technician
- Contech Certified Maintenance Provider
- OSHA Permit-Required Confined Space Entry
- OSHA 10 / 30 Hour
- Hazardous Materials Operations/OSHA Level II
- ISA Certified Arborist
- AGC Safety Team Certification
- Bayfilter Certification
- Oldcastle Perk Filter Certification
- ADS Certification
- NASSCO-PACP
- MACP
- LACP Certifications (CCTV)
- NADCA-ASCS Certification (HVAC)
- NC Stormwater BMP Inspection and Maintenance Certification
- Michigan EGLE Storm Water Operator Certification
- TN Permanent Stormwater Management



Questions?

- AQUALIS provides **FREE** consultations, you can request one today at www.aqualisco.com
- Follow us on LinkedIn to stay up to date on the latest stormwater news!
- Call us at 855.236.1160 if you are interested in partnering with a seasoned water resource professional for all your lift station and stormwater needs.

