**OVERVIEW**

**Goal:** Use soil moisture profile conceptual framework to understand the larger picture of soil moisture at subsurface layer in a GSI system which dictates the system’s response and recovery to a storm event.

**Framework Application** (figure 1)
- Monitor subsurface hydrology
- Determine longevity of a subsurface system to hold water
- Understand system recovery process
- Provide site specific soil conditions

**STUDY SITE**

**Figure 5.** (a) Linear bioswale in northeast Philadelphia at the cross section of Marlborough street and Shackamaxon street, (b) soil moisture sensor installed at 10cm, 55cm and 60cm

**RESULTS**

- Automated identification of points ABCDEFF (figure 10)
- Exploration to volume storage analysis
- Subsurface modelling tool (figure 11)

**FUTURE WORK**

- Automated identification of points ABCDEFF (figure 10)
- Exploration to volume storage analysis
- Subsurface modelling tool (figure 11)

**SUMMARY**

- Established system response and recovery
- Framework provides consistency with which system response to storm events is analyzed
- Knowledge is transferable to other GSI sites with different soil type
- Improved understanding of subsurface hydrology

**Benefit of using conceptual framework**
- Improvements in designs (soil type, depth)
- Track the system's maintenance requirement
- Modelling effort
- Provide realistic expectations of subsurface (especially GSI units) performance in managing storm
- Dictates the efficacy of GSI designs

**METHODOLOGY**

1. Rainfall event selection based on ideal soil moisture profile (figure 2)
2. Identify specific soil moisture points (ABCDEF**) based on the change in slope (figure 2)
3. Categorize soil moisture profile based on pre- and post-storm soil moisture (figure 3)
4. Analyze subsurface parameters
   a. Average soil moisture (figure 1)
   b. Duration of saturation (figure 1)
   c. Soil moisture recession (figure 1)
   d. Time of desaturation (figure 4),
   e. Infiltration and evapotranspiration rates

**FUNDING**

- Established system response and recovery
- Framework provides consistency with which system response to storm events is analyzed
- Knowledge is transferable to other GSI sites with different soil type
- Improved understanding of subsurface hydrology

**Benefit of using conceptual framework**
- Improvements in designs (soil type, depth)
- Track the system’s maintenance requirement
- Modelling effort
- Provide realistic expectations of subsurface (especially GSI units) performance in managing storm
- Dictates the efficacy of GSI designs

**FUTURE WORK**

- Automated identification of points ABCDEFF (figure 10)
- Exploration to volume storage analysis
- Subsurface modelling tool (figure 11)

**SUMMARY**

- Established system response and recovery
- Framework provides consistency with which system response to storm events is analyzed
- Knowledge is transferable to other GSI sites with different soil type
- Improved understanding of subsurface hydrology

**Benefit of using conceptual framework**
- Improvements in designs (soil type, depth)
- Track the system’s maintenance requirement
- Modelling effort
- Provide realistic expectations of subsurface (especially GSI units) performance in managing storm
- Dictates the efficacy of GSI designs

**METHODOLOGY**

1. Rainfall event selection based on ideal soil moisture profile (figure 2)
2. Identify specific soil moisture points (ABCDEF**) based on the change in slope (figure 2)
3. Categorize soil moisture profile based on pre- and post-storm soil moisture (figure 3)
4. Analyze subsurface parameters
   a. Average soil moisture (figure 1)
   b. Duration of saturation (figure 1)
   c. Soil moisture recession (figure 1)
   d. Time of desaturation (figure 4),
   e. Infiltration and evapotranspiration rates

**FUNDING**

- Established system response and recovery
- Framework provides consistency with which system response to storm events is analyzed
- Knowledge is transferable to other GSI sites with different soil type
- Improved understanding of subsurface hydrology

**Benefit of using conceptual framework**
- Improvements in designs (soil type, depth)
- Track the system’s maintenance requirement
- Modelling effort
- Provide realistic expectations of subsurface (especially GSI units) performance in managing storm
- Dictates the efficacy of GSI designs

**FUTURE WORK**

- Automated identification of points ABCDEFF (figure 10)
- Exploration to volume storage analysis
- Subsurface modelling tool (figure 11)