



Interconnected Pond Routing: Sustainable Wetlands

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Agenda for this webinar

- About 1h in duration
- Definition and basic principles of interconnected ponds
- Describe xpswmm tools related to design and analysis of interconnected ponds
- Examples of interconnected pond
- Answer questions provided through chat

Definition of Interconnected Ponds

- A complex network of interconnected and hydraulically interdependent stormwater ponds
- Connected with underground conduits
- Multiple control water surfaces
- Usually located in areas with high groundwater table
- Golf courses and areas with sensitive hydrology
- Normally wet and protect the land from being drained
- Often connected with natural and engineered wetlands
- Cascade of Ponds represent a treatment train
- Difficult to model

Hydrologic Considerations

- Determination of the water table sustaining wetlands
- Maintain existing wetlands based on their class (quality)
- Determine drainage areas to existing wetlands
- Establish predevelopment hydrographs and maximum allowable discharge
- Significant ground and surface water interaction may require continuous modeling

Hydrologic Modeling

- Using new design surface layout ponds and wetlands and determine their drainage areas using new design surface
- Select a hydrologic method and determine parameters
- Create nodes and assign catchments to the nodes
- Select design storms or continuous rainfall records
- Use the SWMM Runoff method if groundwater modeling is necessary for seasonal
- Determine hydrographs passing through the site

Hydraulic Considerations

- Control elevation(s)
- Hydrology determines the active volume stored
- Use also an rise for the 25 year storm
- Depth vs. area for the node storage
- Set boundary conditions (outfalls)
- Size interconnections and control structures in the model

Typical Hydraulic Goals

- Differences in max HGL to about 1/10th of a foot
- Control structures
 - optimize the rise in the ponds and discharge rates
 - return to control elevation in less than 2 weeks in a 25 year event
- Crowns of connections between ponds is below control
- 25yr water levels for roads and 100yr building elevations
- Reduce large flow reversals

Hydrologic Capabilities in SWMM

- Multiple hydrology methods **SWMM Runoff**, SCS, SBUH, Clark, CUHP, LA County ...
- Continuous simulation with deterministic model
- Simulation of evaporation, groundwater and infiltration
- Multiple subcatchments per node
- Global Storms for multiple return periods
- Simulation of LID
- Redirect surfaces i.e. impervious to pervious runoff
- Water quality

Hydraulic Capabilities in SWMM

- Full dynamic wave
 - Full system backwater and flow reversals
 - Flat and adverse slopes
 - Open channel and pressurized flow
 - Simulation of storage in conduits and nodes
- All conduit shapes: circular, arch, elliptical, natural...
- Pumps, weirs, orifices, rating curves for structures
- Evaporation
- Exfiltration can be simulated (pond losses)

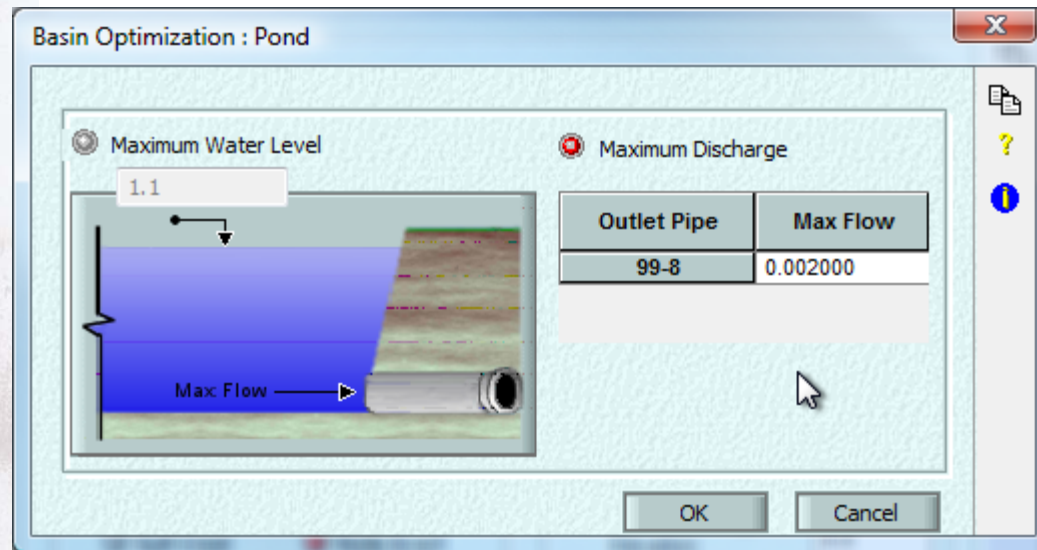


xpswmm Tools

- AutoCAD and GIS Integration for data import/export
 - Import/Export links, nodes and polygons from ESRI or Mapinfo
 - Import/Export links, nodes and polygons from AutoCAD
 - Create network and surfaces from LandXML Import
- DTM
- Visualization or Animation of the HGL
- XP-Tables
- Global Storms and Scenario manager
- Pond Optimization (new xpswmm2009)

Pond Optimization

- Set maximum water level
- Set maximum Discharge



Typical Models

- Eastern Malaysia development with scenarios for high tide and tide gate
- Southern Florida mixed residential and golf course development with wetlands
- 2D model from Tampa, FL with overland flows and ponds modeled in both 1D and 2D