

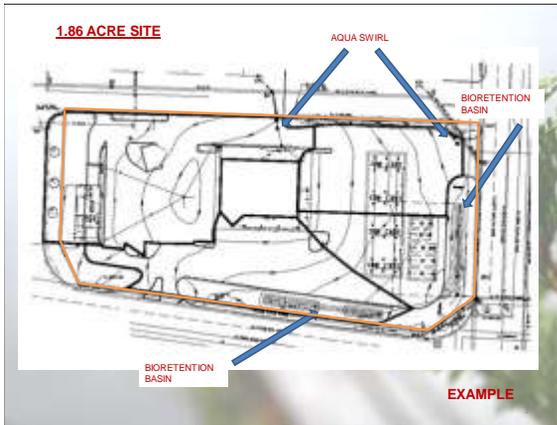
# BIORETENTION BASINS ON SMALL COMMERCIAL DEVELOPEMENTS

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## WHERE CAN YOU FIND GUIDELINES TO DESIGN BIORETENTION BASINS?

- As of December 2006, the ODNR Rainwater and Land Development Manual has updated the expected minimum requirements for bioretention design.
- Other reference materials.
- Many municipal jurisdictions, including the SWCD and Ohio EPA accept the current Rainwater and Land Development Manual for design reference.
- Note: Some items regarding Bioretention in the Rainwater Manual need some attention (k value, basin sizing formula)



## ITEMS TO NOTE DURING BIORETENTION CONSTRUCTION



BE SURE TO STABILIZE SOIL WALLS TO AVOID WASHOUT INTO GRAVEL AND PLANTING SOIL DURING CONSTRUCTION

BIORETENTION BASIN SHOULD NOT BE INSTALLED UNTIL SITE IS 90% STABILIZED AND THERE IS MINIMAL SEDIMENT LAIDEN RUNOFF



FUEL TANKS; UNDERSTAND WHEN A BASIN SHOULD HAVE A LINER FOR REASONS OTHER THAN GROUNDWATER

## ITEMS TO NOTE DURING BIORETENTION CONSTRUCTION (cont'd)



UNDERSTAND THE EQUIPMENT AND SPACE REQUIRED TO PERFORM CONSTRUCTION



UNDERSTAND THE COMPLEXITY OF CONSTRUCTION AND WHAT YOU SPECIFYING.

## ITEMS TO NOTE DURING BIORETENTION CONSTRUCTION (cont'd)



- COMPACTION SHOULD BE KEPT TO A MINIMUM; LIGHT COMPACTION RECOMMENDED.
- SOIL SHOULD BE PLACED IN 12" TO 18" LOOSE LIFTS.
- WATERING THE PLANTING SOIL DURING INSTALLATION HELPS ACHIEVE COMPACTION WITHOUT EXCESSIVE MECHANICAL COMPACTION.

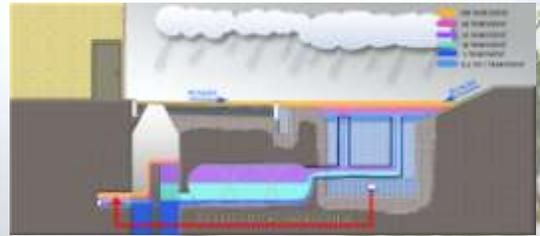
BE CONSCIENCIOUS WHERE THE MATERIALS ARE BEING STORED PRIOR TO INSTALLATION.



## IMPLEMENTING STORMWATER DETENTION AND BIORETENTION ON SMALL DEVELOPMENTS

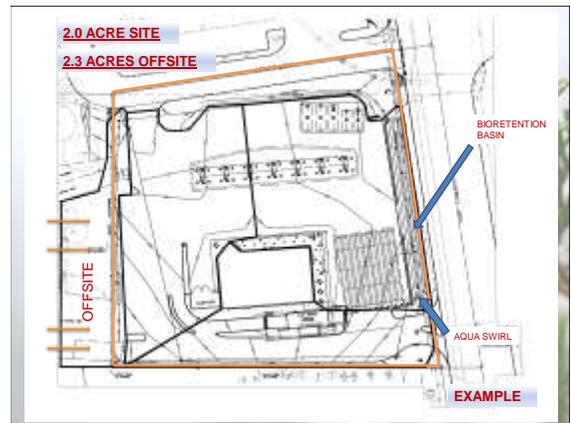
- **What are good practice design considerations?**
  - Proper overflow inlet capacity.
  - Culvert analysis of connected overflow risers.
  - Berm heights.
  - Grading techniques.
  - Pipe locations and depths.

## EXAMPLE

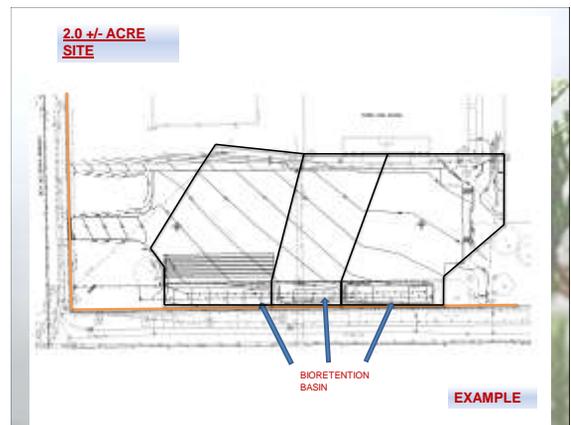


## CALCULATIONS?

- **Previously mentioned analysis calculations requires interconnected ponds, and the study of runoff through a hydraulically routed system which works in series.**
- **Recommend utilizing software which allows you to calculate interconnected ponds.**



## PHOTO OF PREVIOUS DESIGN EX.



## PREVIOUS EX. PHOTOS



RIGHT AFTER CONSTRUCTION



RIGHT AFTER CONSTRUCTION



RIGHT AFTER CONSTRUCTION



1 YEAR +/- LATER

## BIORETENTION IN ACTION

(click on movie)



- ELIMINATING CURB HELPS DISSIPATE CONCENTRATED FLOW.
- ELIMINATING CURB HELPS WITH LOCALIZED PONDING IN BASIN.

## DESIGN CONSIDERATIONS



GRADING DESIGN MUST CONSIDER SURROUNDING CONDITIONS TO INSURE SAFETY.

BE INNOVATIVE AND CONSIDER MULTIPLE BASINS WHICH MAY BE STEPPED TO MATCH GRADE. THIS EXAMPLE HAS THREE BASINS IN SERIES WHICH DROP APPROXIMATE 1 TO 2 FEET IN GRADE BETWEEN BASINS.



## DESIGN CONSIDERATIONS



OVERFLOW



POOR INSTALLATION

GOOD EXAMPLE ILLUSTRATING THE IMPORTANCE OF UNDERSTANDING WHERE LARGER STORM EVENTS WILL END UP



ADDITIONAL HEAD

WQv

## PLANTINGS

IN ADDITION TO SPECIFYING PLANTS WHICH CAN TOLERATE SATURATED CONDITIONS, SPECIFY PLANTS WHICH ADD AESTHETIC VALUE TO THE PROPERTY.



ENSURE PLANTINGS ARE TAKING AND GROWING. THE ROOTS OF THE PLANTS PROVIDE FOR MUCH OF THE POLLUTANT REMOVAL.

## BIORETENTION IN ACTION

CONSIDER BIORETENTION BASIN IS WORKING PROPERLY WHEN:

- THERE IS NO STANDING WATER.
- LITTER DID NOT MAKE IT INTO CITY STORM SEWER.
- PLANTS ARE HEALTHY AND GROWING.



## FOR ADDITIONAL CONSULTATION

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