

# Moving Watershed Management Into The Watershed

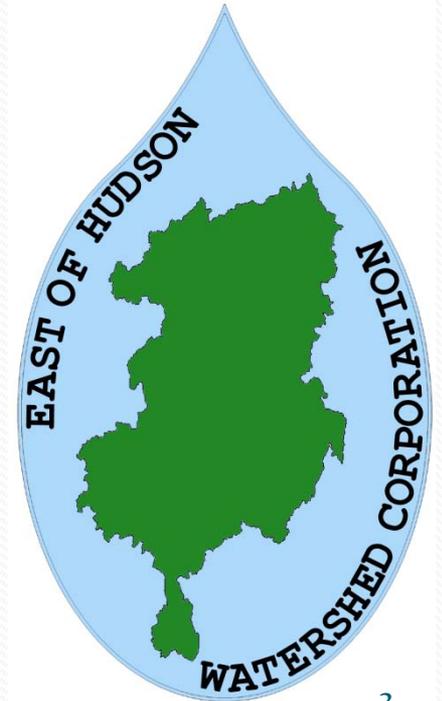
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# Objectives

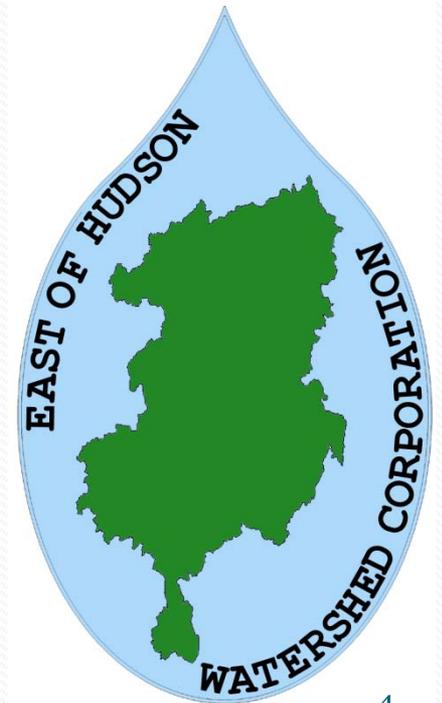
- Where?
- Why?
- Who?
- What?
- How?





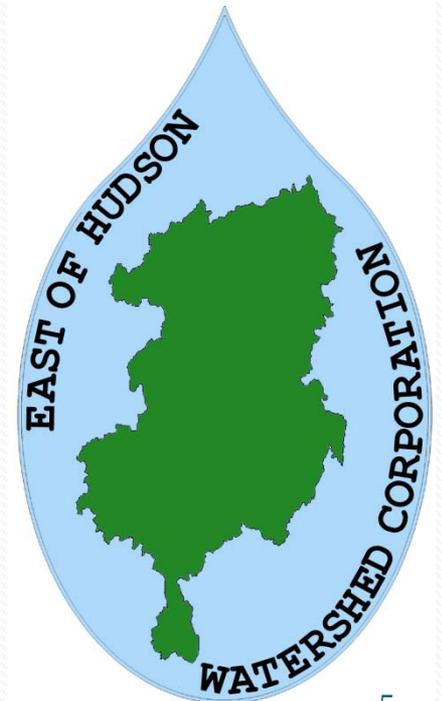
# Why?

- MS4 General Permit Part IX: Heightened Requirements for Phosphorus Reduction
- Regional Stormwater Entity (RSE)
- 460 kg (1,012 lbs) over a 5-year period
- Bubble compliance

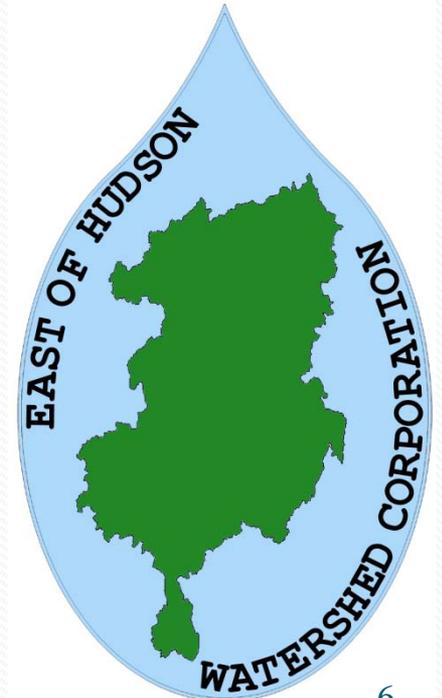


# Who?

- 19 Members
  - Carmel (T)
  - Putnam Valley (T)
  - Kent (T)
  - Southeast (T)
  - Patterson (T)
  - Bedford (T)
  - Cortlandt (T)
  - Lewisboro (T)
  - Mt. Kisco (T/V)
  - New Castle (T)
  - North Castle (T)
  - North Salem (T)
  - Pound Ridge (T)
  - Somers (T)
  - Yorktown (T)
  - Brewster (V)
  - Pawling (T/V)
  - Putnam County
- 2 Employees

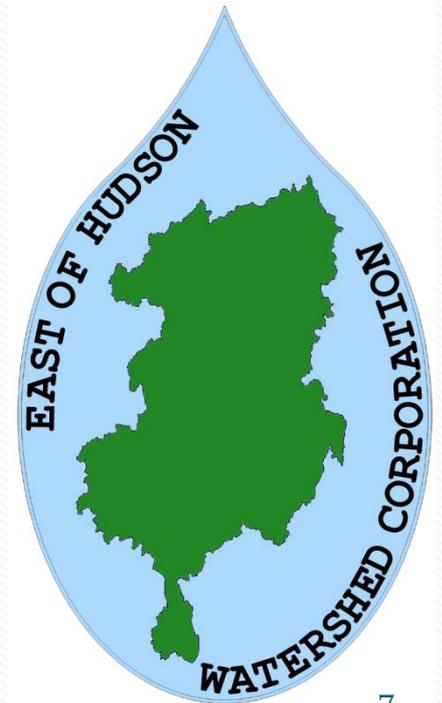


# Who?



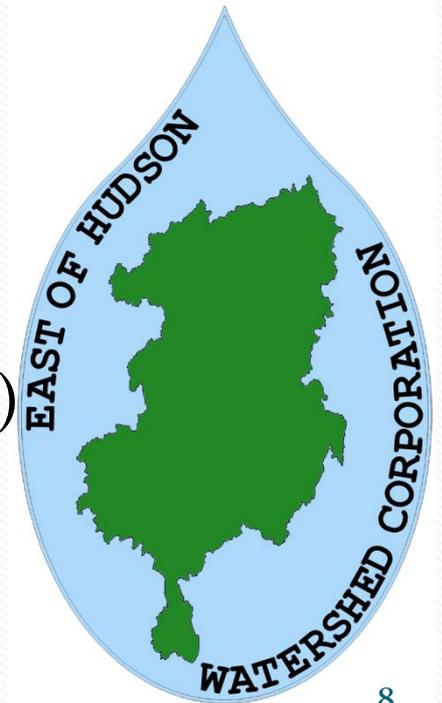
# What?

- Each county has a 5-year stormwater retrofit plan.
- Master list of projects
  - Based on limited field reconnaissance.
  - Reviewed/accepted by the NYSDEC.
- Project list is revised as needed.



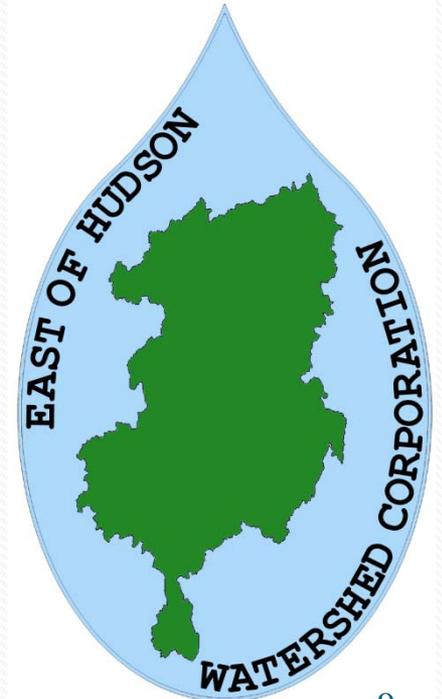
# What?

- 48 projects in design
  - 43 projects with \$908,000 consulting fees across 6 companies.
  - Potential phosphorus reduction = 80.9 kgs (177 lbs)
  - Total estimated cost = \$4,567,000
  - Five Year 2 projects with potential phosphorus reduction= 126.6 kgs (278.5lbs)
  - Total estimated cost < \$ 3 million



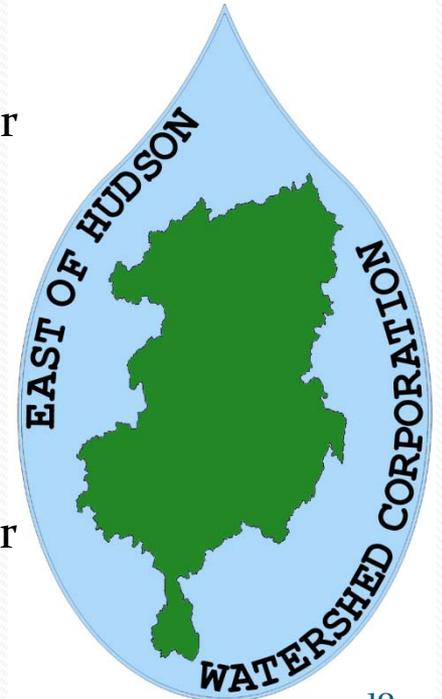
# How?

- Funding provided by NYCDEP.
  - NYSDEC grants
- 4 Primary Funding Sources
  - 2010 Water Supply Permit: \$15 million
  - 2007 FAD: \$5 million
  - 1997 MOA to Westchester: \$10 million
  - 1997 MOA to Putnam: \$8.2 million
- RFPs for professional services
- RFBs for construction services



# How?

- Types of stormwater retrofit projects:
  - Micropool Extended Detention Pond
  - Wet Pond
  - Wet Extended Detention Pond
  - Multiple Pond System
  - Pocket Pond
  - Shallow Wetland
  - Extended Detention Shallow Wetland
  - Pond/Wetland System
  - Pocket Wetland
  - Infiltration Trench
  - Infiltration Basin
  - Dry Well
  - Surface Sand Filter
  - Underground Sand Filter
  - Perimeter Sand Filter
  - Organic Filter
  - Bioretention
  - Dry Swale
  - Wet Swale
  - Hydrodynamic Separator



# How?

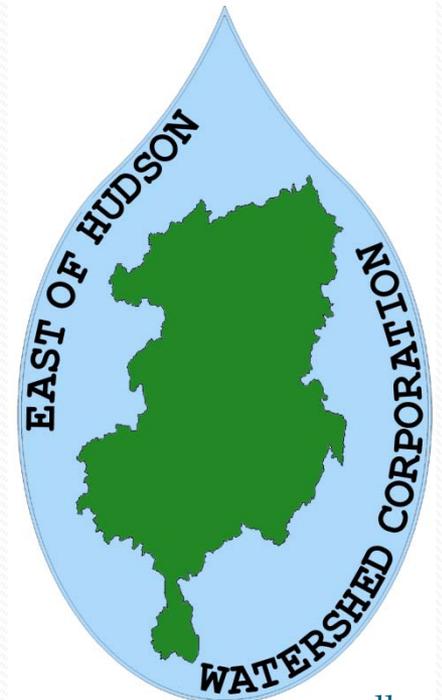
- Calculate  $WQ_v$  using the 90<sup>th</sup> percentile storm.
- Loading Coefficients

## Land Use

- Developed Open Spaces  
(golf courses, parks, large lawns)
- Impervious
- Industrial
- Residential
- Actively Grazed Pasture
- Commercial
- Forest

## Phosphorus Concentration

- 0.59 mg/L
- 0.50 mg/L
- 0.45 mg/L
- 0.41 mg/L
- 0.40 mg/L
- 0.34 mg/L
- 0.15 mg/L



# How?

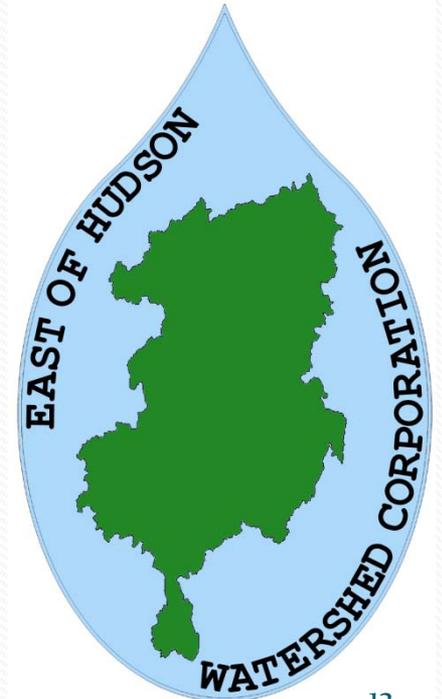
- Simple Method

$$P_{load} = 4.16 * R_v * A * EMC$$

$R_v$  = Runoff coefficient

A = Area (acres)

EMC = Event Mean Concentration (mg/L)



# How?

- Channel Enlargement Method

$$P_{load} = 453,600 * (R - 1) * A * L * BD * P_{test} * RP$$

R= enlargement ratio

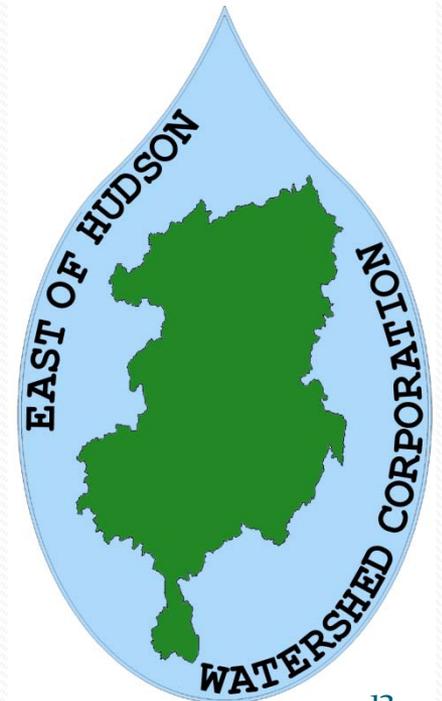
A= Existing channel area (SF)

L= Channel length (ft)

BD= Bulk Density (typ. 95 lb/CF)

$P_{test}$ = soil phosphorus concentration (typ. 300 mg/kg)

RP= relaxation period (alluvial streams= 67 years)



# Questions?

