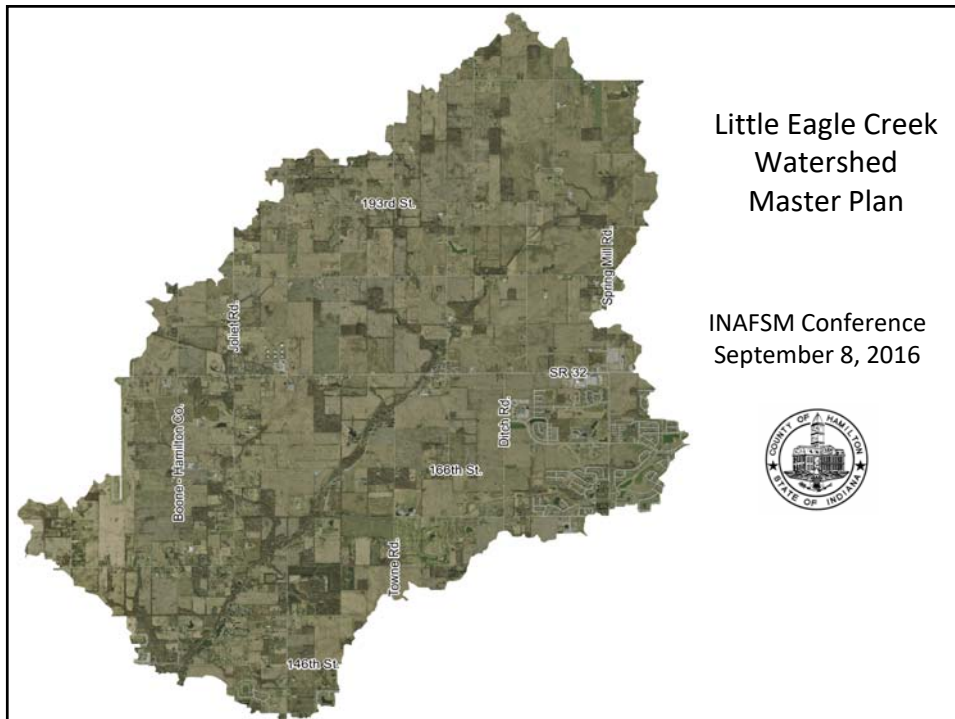


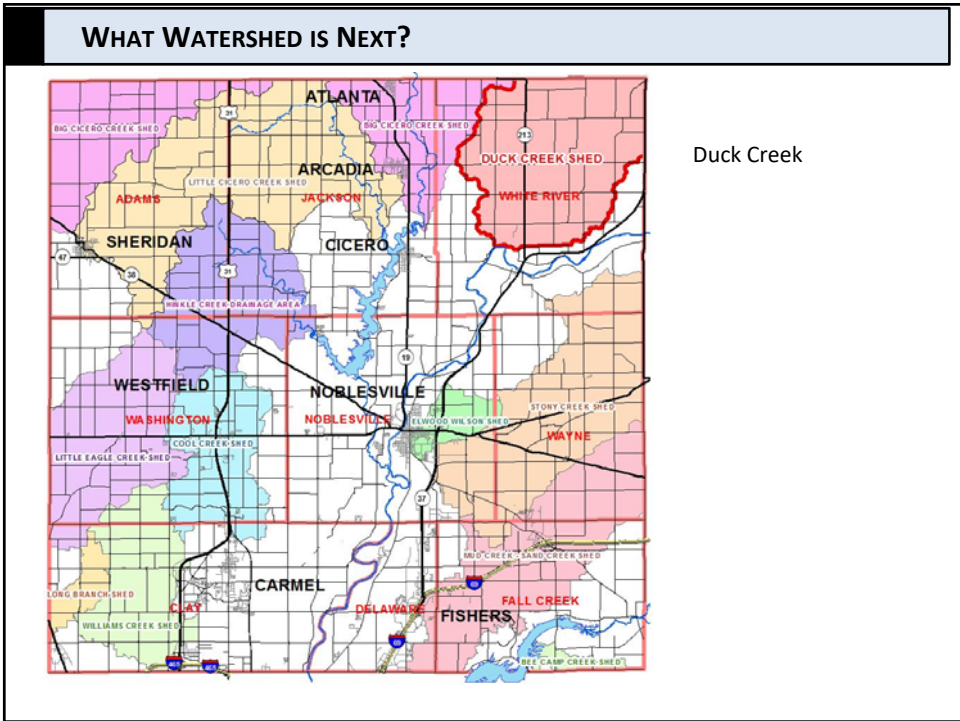
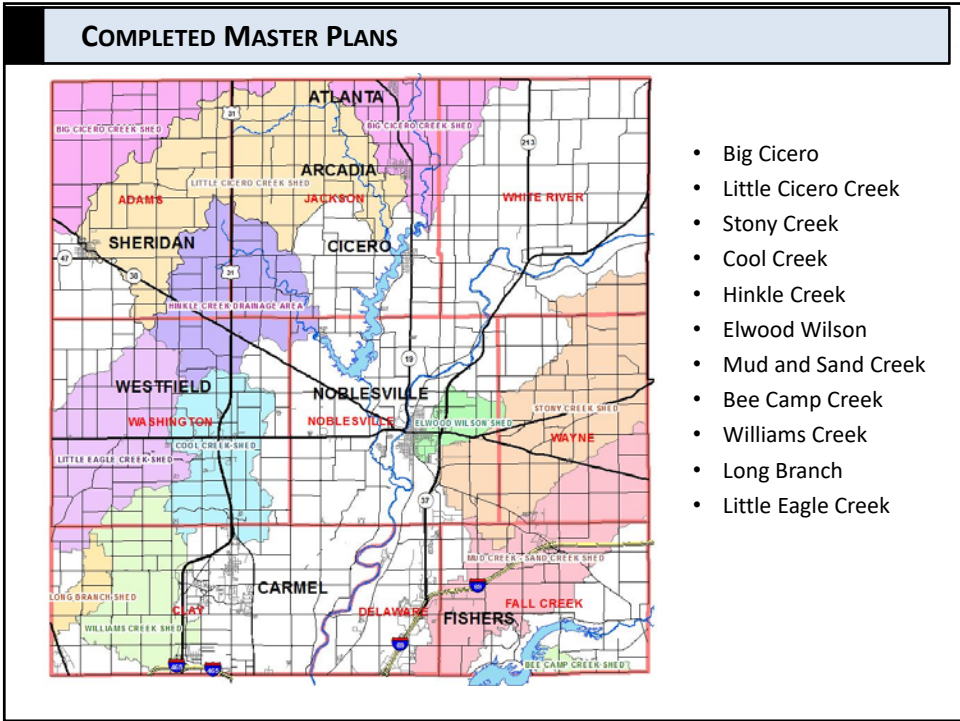
Watershed Master Planning – What, Why and How

Kenton Ward, CFM
Hamilton County Surveyor

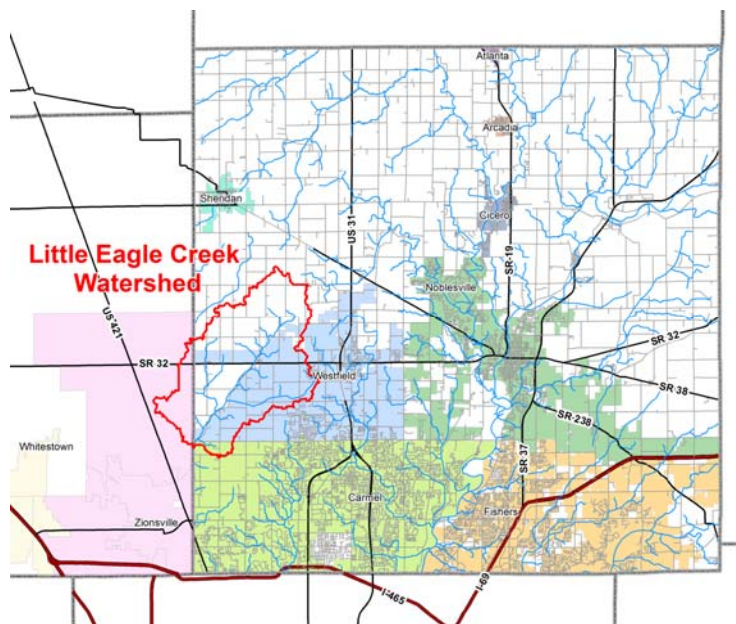
Lenny Noens, PE, CFM
Heather Finrock, PE, CFM
Christopher B. Burke Engineering, LLC

INAFSM Annual Conference
September 2016

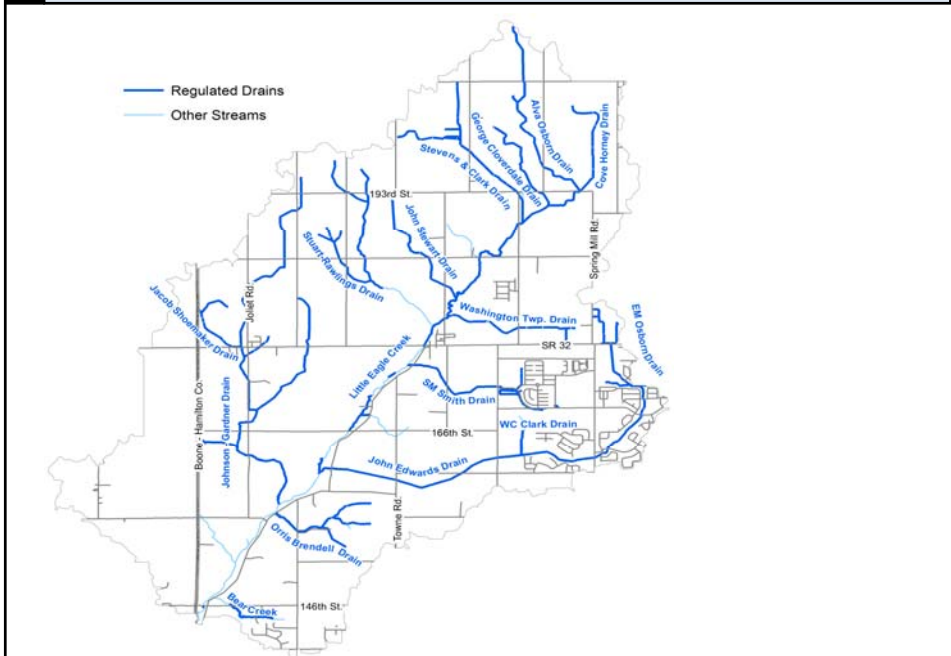


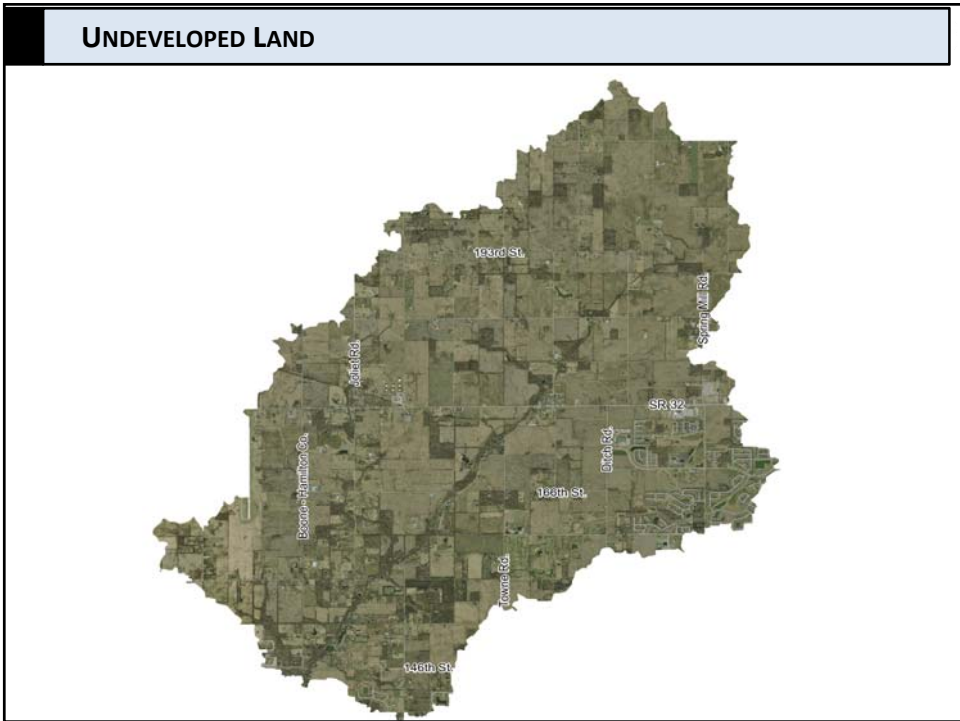
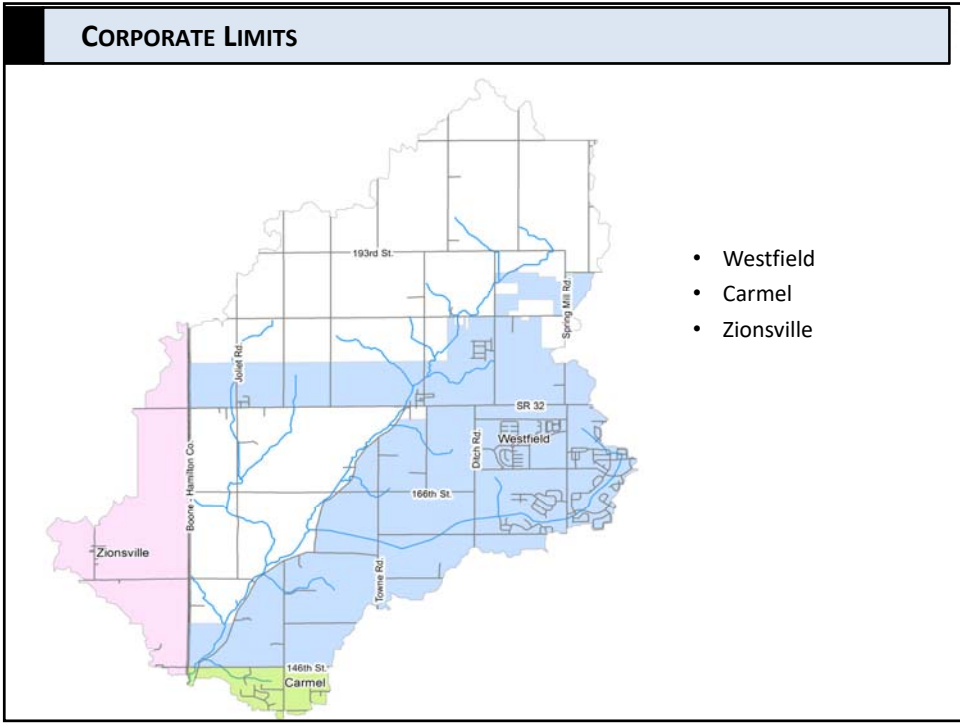


LITTLE EAGLE CREEK WATERSHED MASTER PLAN



STREAMS AND REGULATED DRAINS IN THE WATERSHED





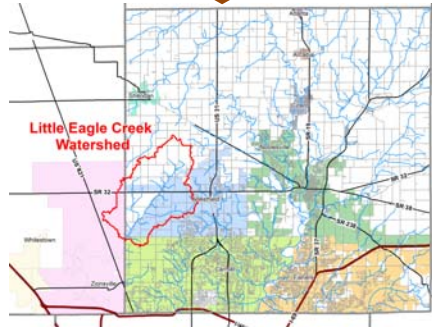
WATERSHED PLANNING IN HAMILTON COUNTY

CONCERN:

As Carmel and Westfield continue to grow and expand, **watersheds** in Western Hamilton County face increased urbanization which could lead to **environmental and flooding concerns.**

RESPONSE:

Holistic-based watershed planning provides a proven framework to **identify stormwater management concerns** and provide a **recommended plan** so that new stormwater problems are not created and existing problems can be addressed.



WATERSHED MASTER PLAN

- **Guide proper stormwater management as development occurs to:**
 - Preserve natural & beneficial functions of the natural drainage systems
 - Preserve & enhance stormwater quality
- **Provide long term guidance to local officials for:**
 - Stormwater regulatory decisions
 - Zoning decisions
 - Other development-related decisions



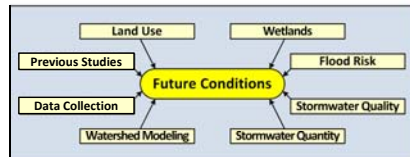
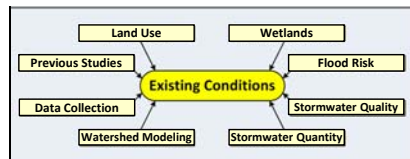
WHAT IS A MASTER PLAN?



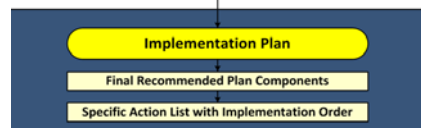
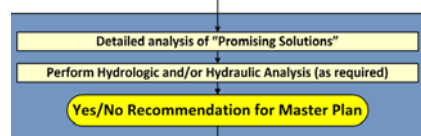
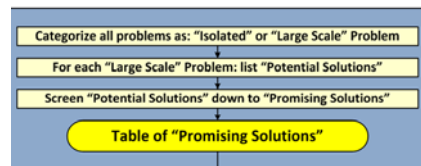
POGUES RUN FACILITY REDESIGN LAYOUT

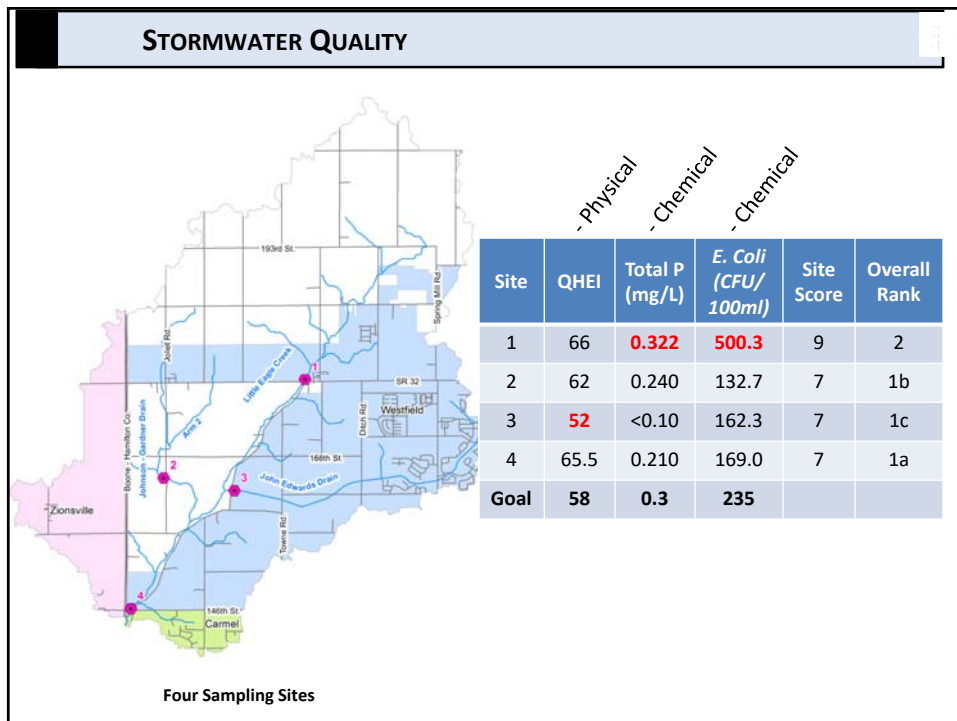
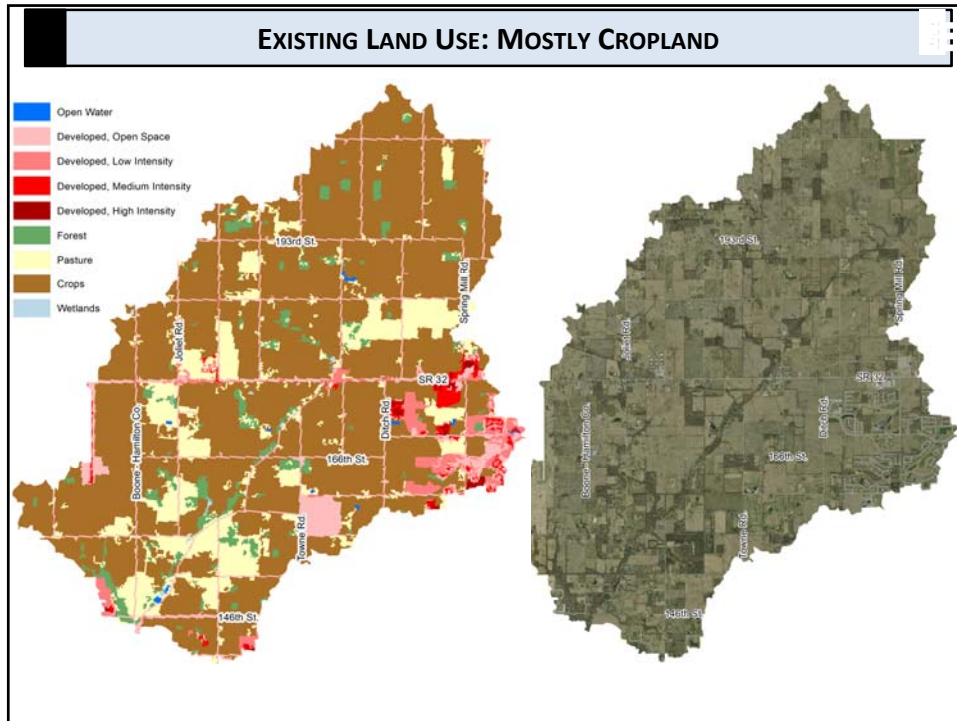


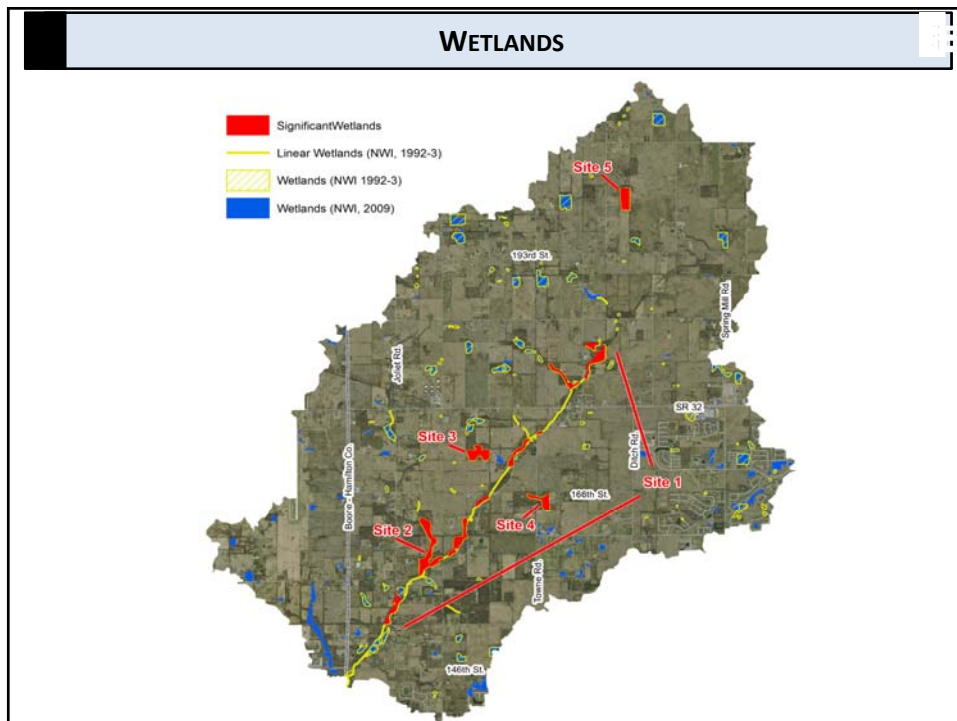
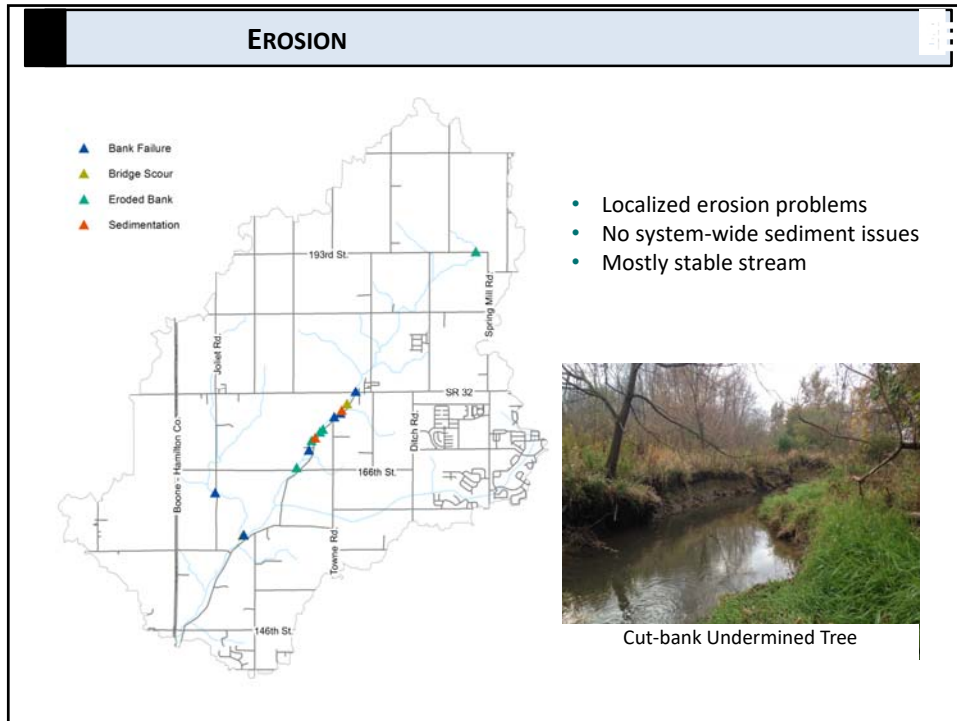
THE MASTER PLANNING PROCESS: SEVEN STEPS

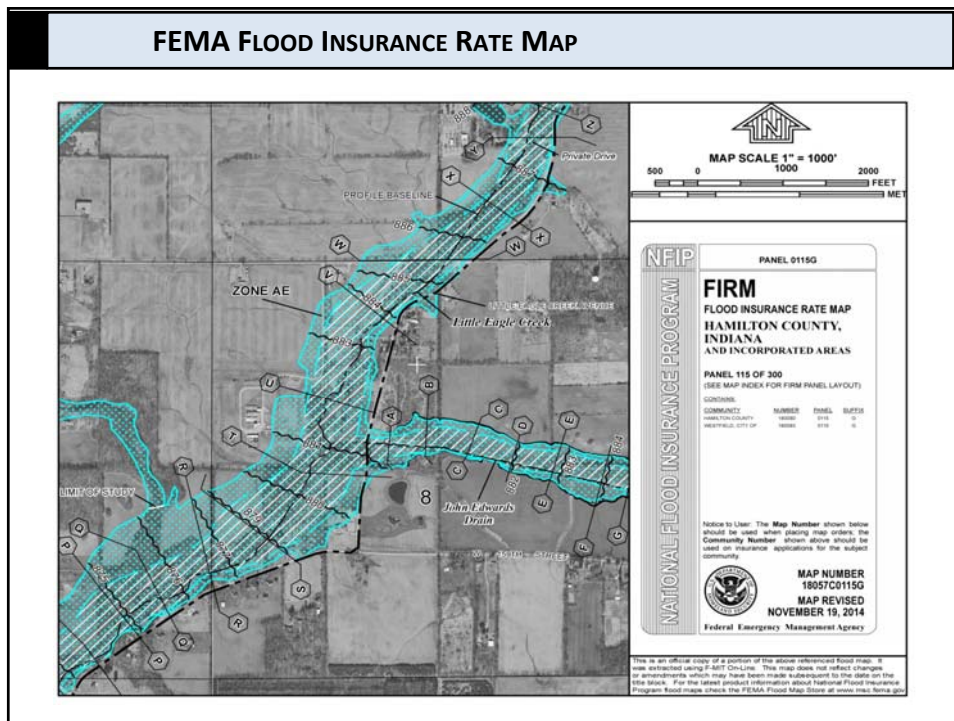
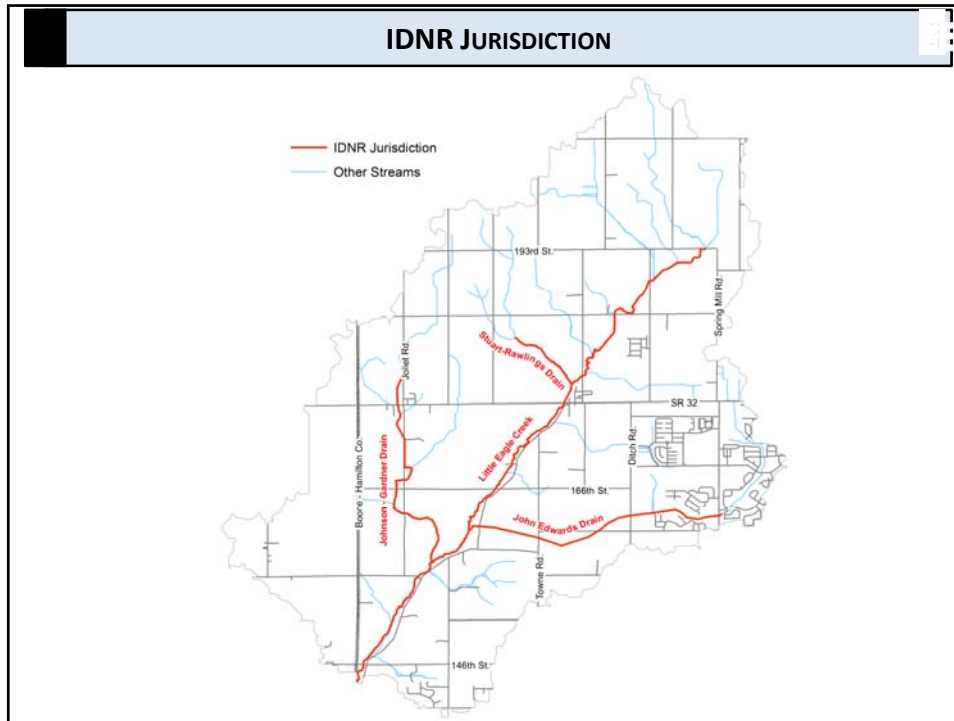


GOALS	EVALUATION CRITERIA
Reduce existing extent of flooding & drainage problems	Technical Criteria
Improve water quality of stormwater runoff	Economic Criteria
Protect, enhance & restore natural conveyance & storage	Environmental Criteria
Prevent future increased vulnerability to watershed problems	Institutional Criteria



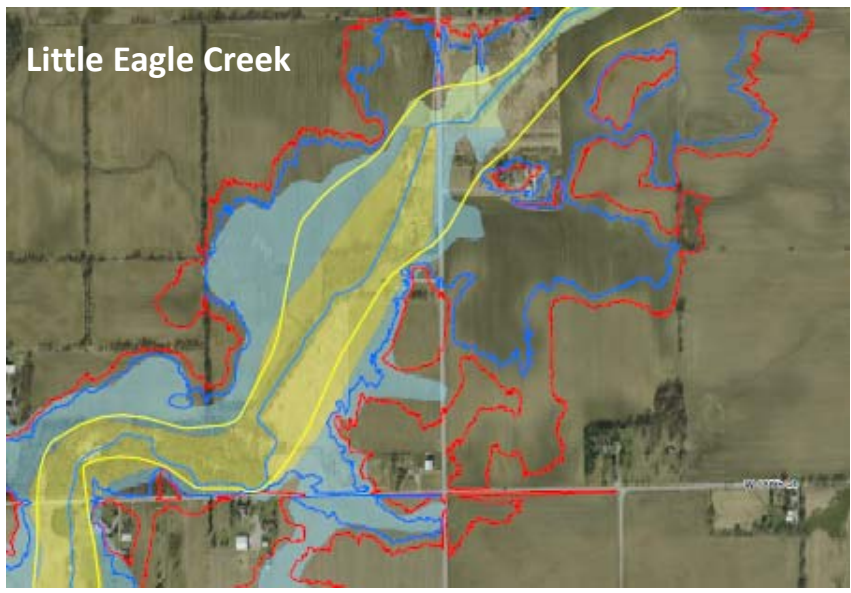






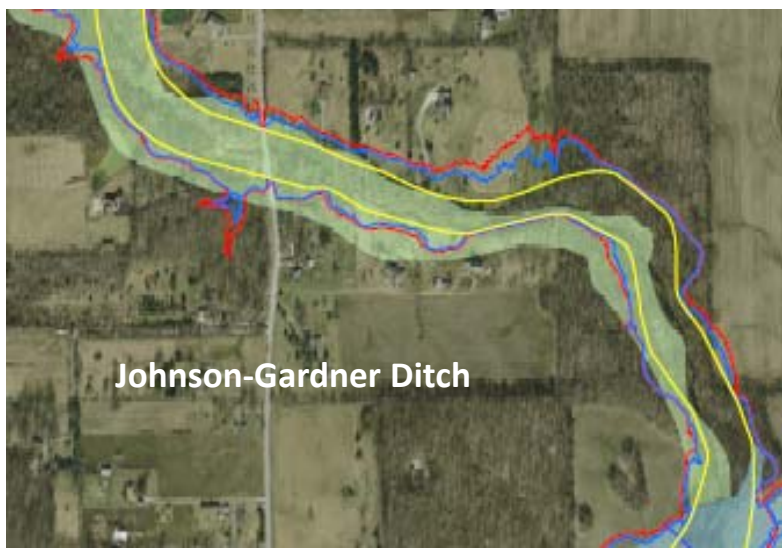
REVISED FLOOD HAZARD MAPPING

Little Eagle Creek

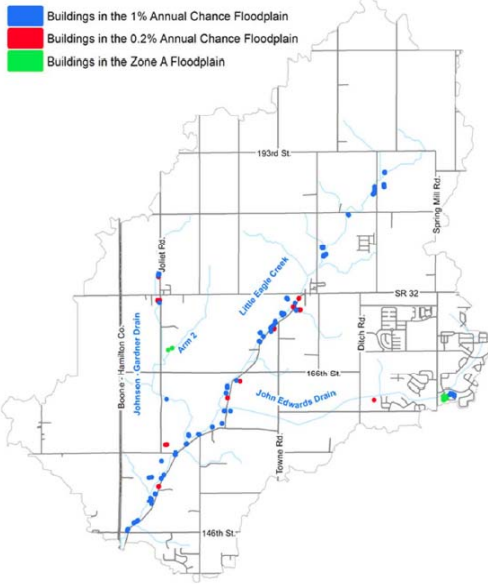


REVISED FLOOD HAZARD MAPPING

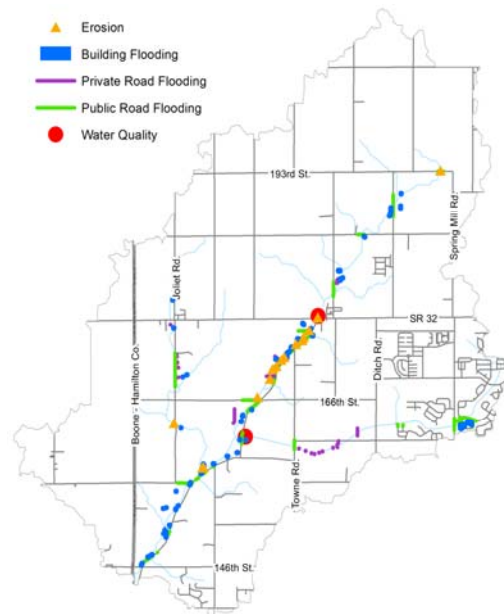
Johnson-Gardner Ditch



BUILDINGS IN FLOOD HAZARD AREAS



EXISTING AREAS OF CONCERN



GOAL IS TO PREVENT THE NEED TO SOLVE FUTURE PROBLEMS



HOW DO WE MASTER PLAN?

- Gather Existing Condition Data
- Analyze...
 - Hydrology
 - Hydraulics
 - Erosion
 - Water Quality
- List Problems
- List Possible Solutions
- Recommend Promising Solutions

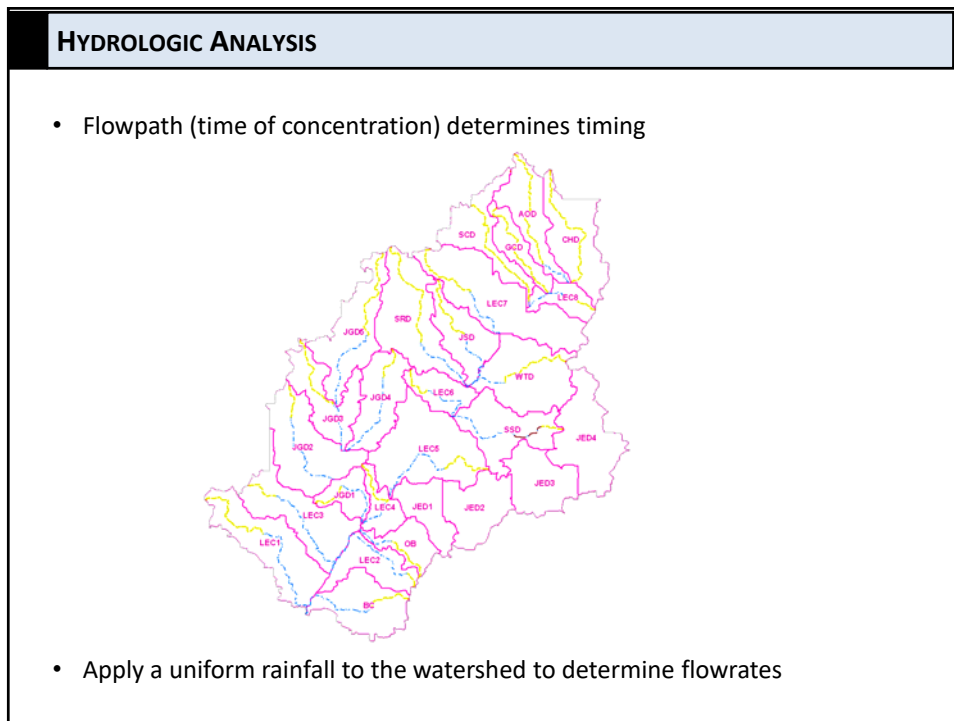
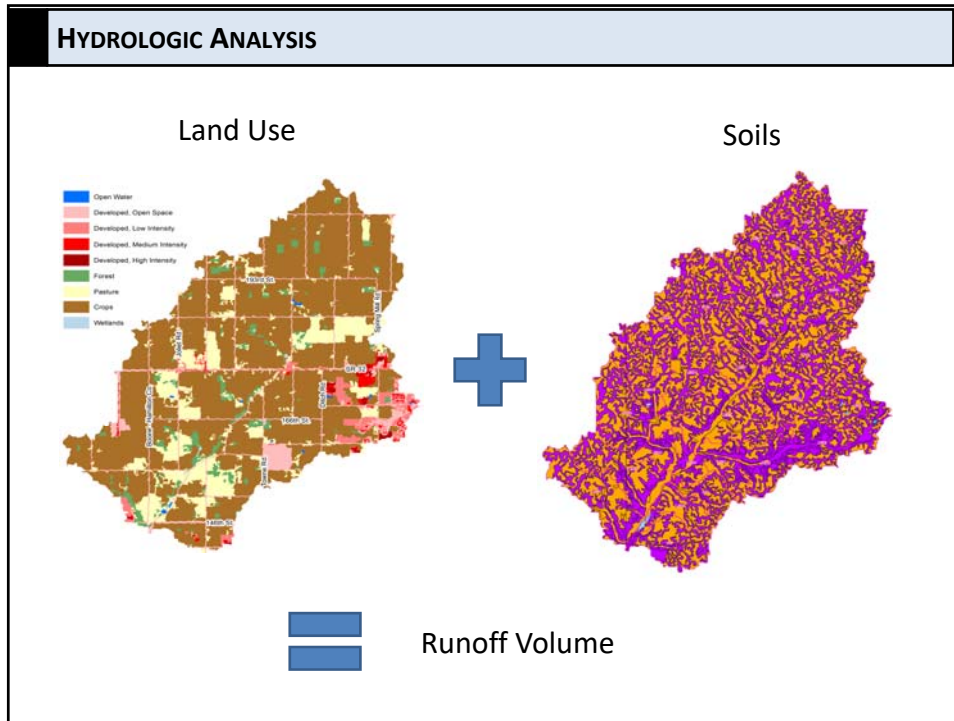


HYDROLOGIC ANALYSIS

- Delineate subwatersheds on existing terrain



- Develop parameters to describe the subwatersheds



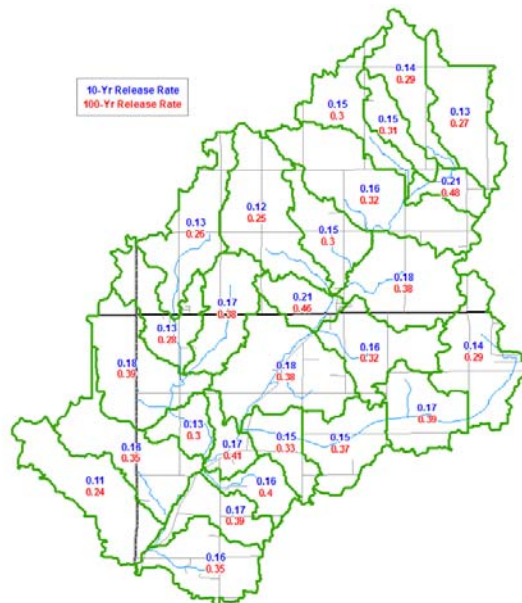
HYDROLOGIC ANALYSIS

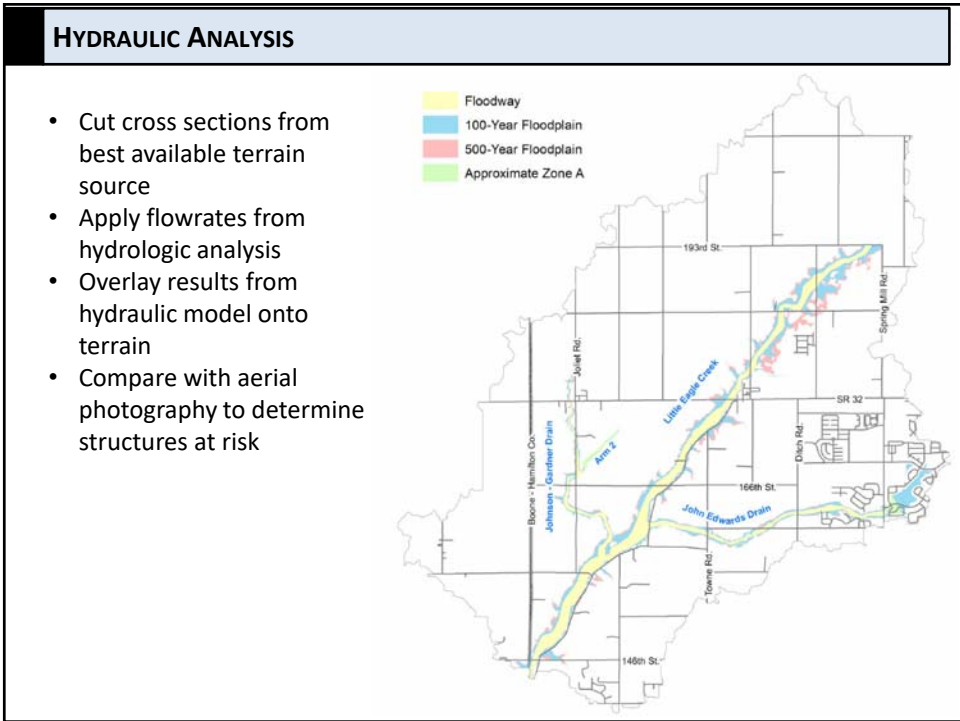
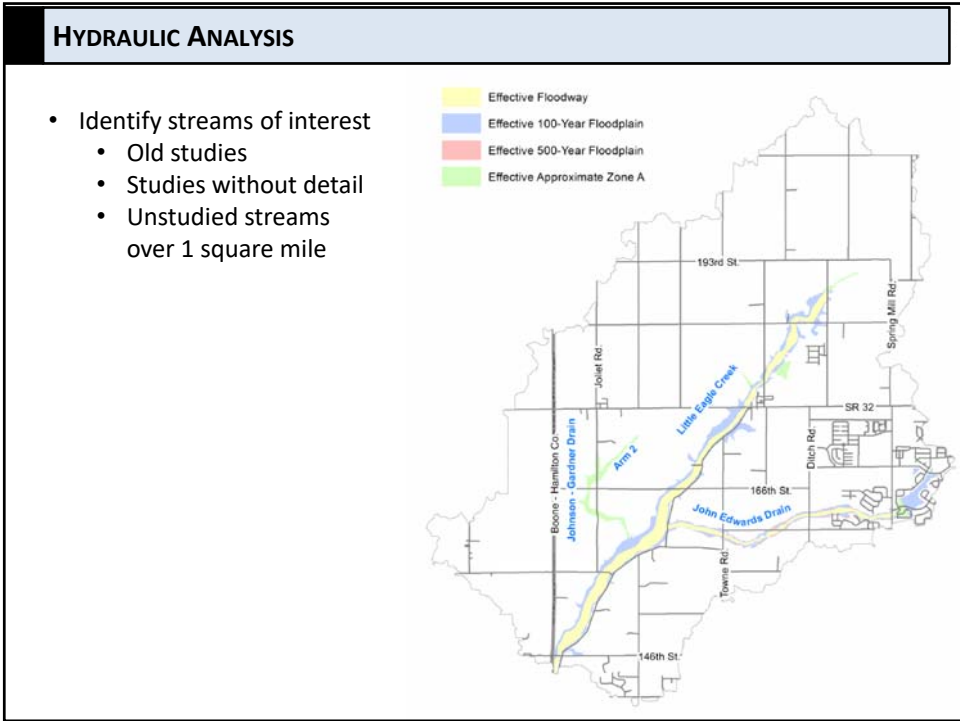
Why Do We Want Flowrates?

- Use flowrates along main streams for hydraulic analysis
- Evaluate countywide allowable release rates
 - Many communities have a generalized allowable release rate
 - Hamilton County specifies 0.1 cfs/ac (10-year) and 0.3 cfs/ac (100-year)
 - Is that appropriate for *this* watershed?

HYDROLOGIC ANALYSIS

- Each subwatershed has a flowrate computed in the hydrologic model
- Determine existing release rates by dividing the flowrate by subwatershed area
- Existing release rates ranged from 0.11 - 0.21 cfs/ac (10-year) and 0.24 - 0.48 cfs/ac (100-year)
- Matches very well with countywide allowable release rates





EROSION

- Walk the stream looking for:
 - Unvegetated sand bars
 - Heavy sediment deposits
 - Streambank failure
 - Poor agricultural field maintenance



Vegetated Sandbar



Unvegetated drainage swale

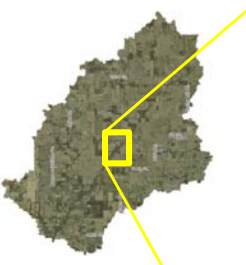
SAMPLE MASTER PLAN SOLUTION

Update Ordinance & Technical Standards


- Add Channel Protection Volume Requirements and Allowance for LID/Green Practices
 - Reduce future increase in channel bank erosion
 - Reduce nuisance flooding
 - Lessens the impact of development on water quality
- Update Pollutant Removal Requirements
 - Lessens the impact of development on water quality

SAMPLE MASTER PLAN SOLUTION

Stabilize Streambank Along Little Eagle Creek



Watershed Aerial View

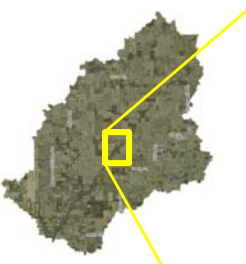


Streambank Stabilization Location


- Stabilization isn't necessary unless infrastructure is threatened
- Stabilize in this location due to proximity of erosion to Little Eagle Creek Ave.
- Minor amount of grading work to restore streambank
- Stream velocities are slow enough for vegetated erosion control

SAMPLE MASTER PLAN SOLUTION

Decrease Low-Flow Channel Width



Watershed Aerial View



Decrease Low-Flow Channel Width Location

- Overly wide channel sections can cause sediment imbalance and instability
- Will reduce likelihood of downstream erosion
- Modify stream in these areas to similar cross sectional area upstream and downstream

SAMPLE MASTER PLAN SOLUTION

Modify Agricultural Practices

- Increase use of cover crops
 - Can reduce runoff and soil loss by 50%
 - Some cover crops varieties with long roots can pull nutrients up through soil for primary crop
- Increase use of no-till
 - Can reduce runoff and soil loss by 90% when combined with cover crops
- Increase use of grassed waterways
 - Useful where gullies have/will form
 - Cost-share programs available through NRCS
 - Waterway must be in place for a minimum of 10-years with cost-share

Will reduce likelihood of erosion and improve water quality

SAMPLE MASTER PLAN SOLUTION

Floodproof Structures in the Floodplain

- Limited grant/cost-share funding available to individual homeowners
- Small retrofits can reduce flood insurance premiums
- Examples:
 - Raise electrical outlets above Base Flood Elevation
 - Raise mechanical systems above Base Flood Elevation
 - Create or increase size of crawl space openings to allow flood waters to pass through

See "Homeowner's Guide to Retrofitting"
<http://www.fema.gov/media-library/assets/documents/480>

Maximum protection level is 3 feet (including freeboard)

Backflow valve prevents sewer and drain backup

Shields for opening

External coating or covering impervious to floodwater

SAMPLE MASTER PLAN SOLUTION

But wait...

Where's the fancy multi-million dollar, saves everyone project?

