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Objective/Background:

Grace United Methodist Church in Lafayette, Indiana, has a plot of poorly drained land that ponds during storm events and attracts mosquitoes. The objective of this project is to manage runoff water, provide ecological services, and serve as an educational tool for the community. This will be accomplished through a constructed wetland among other best management practices. The project may qualify for up to 75% funding through the Wabash River Enhancement Corporation (WREC), and the final proposal was submitted in April of 2015.

Design Solution:



Figure 1. Grace Methodist Project Scope.

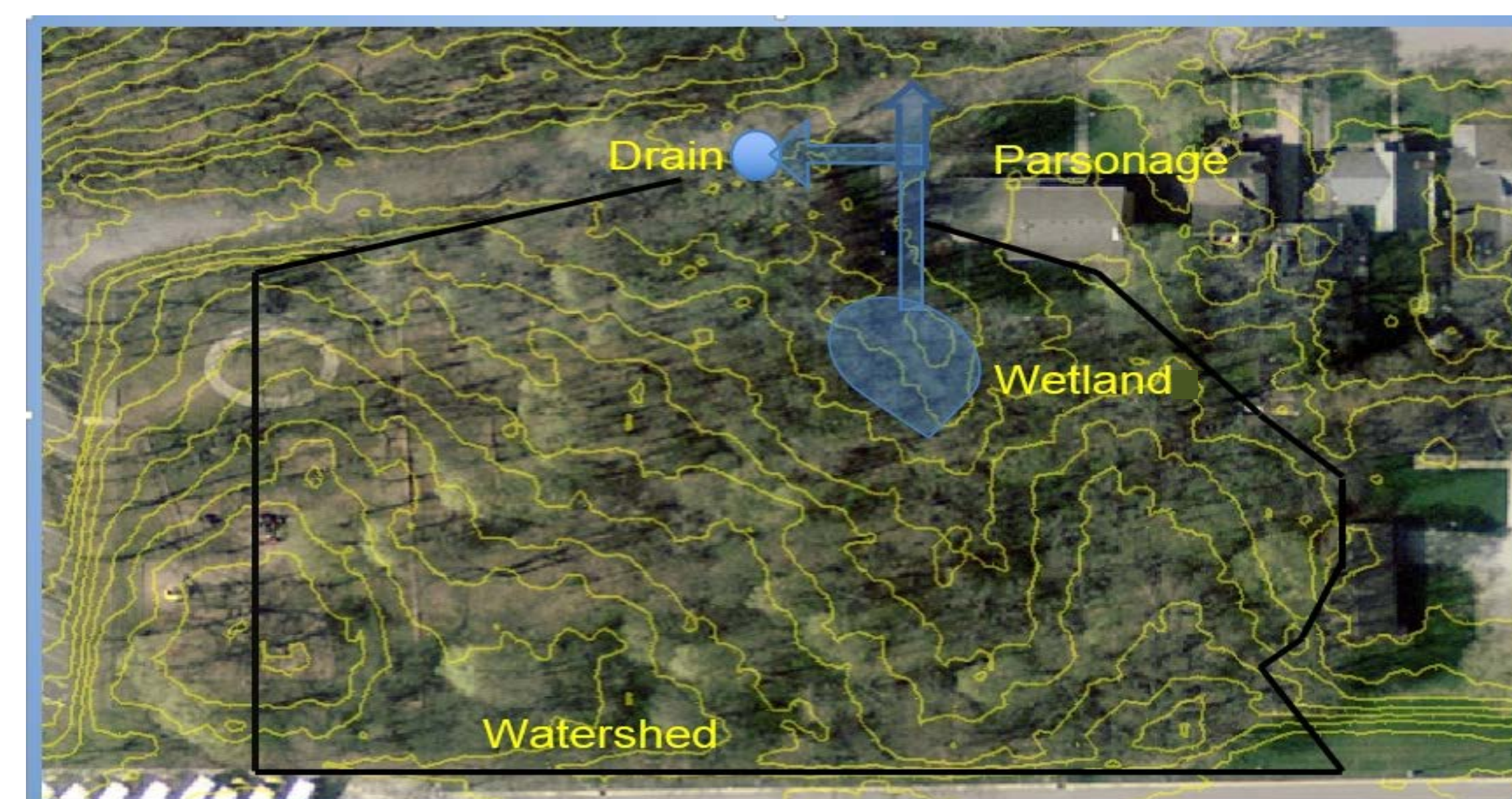


Figure 2. Wetlands Site.

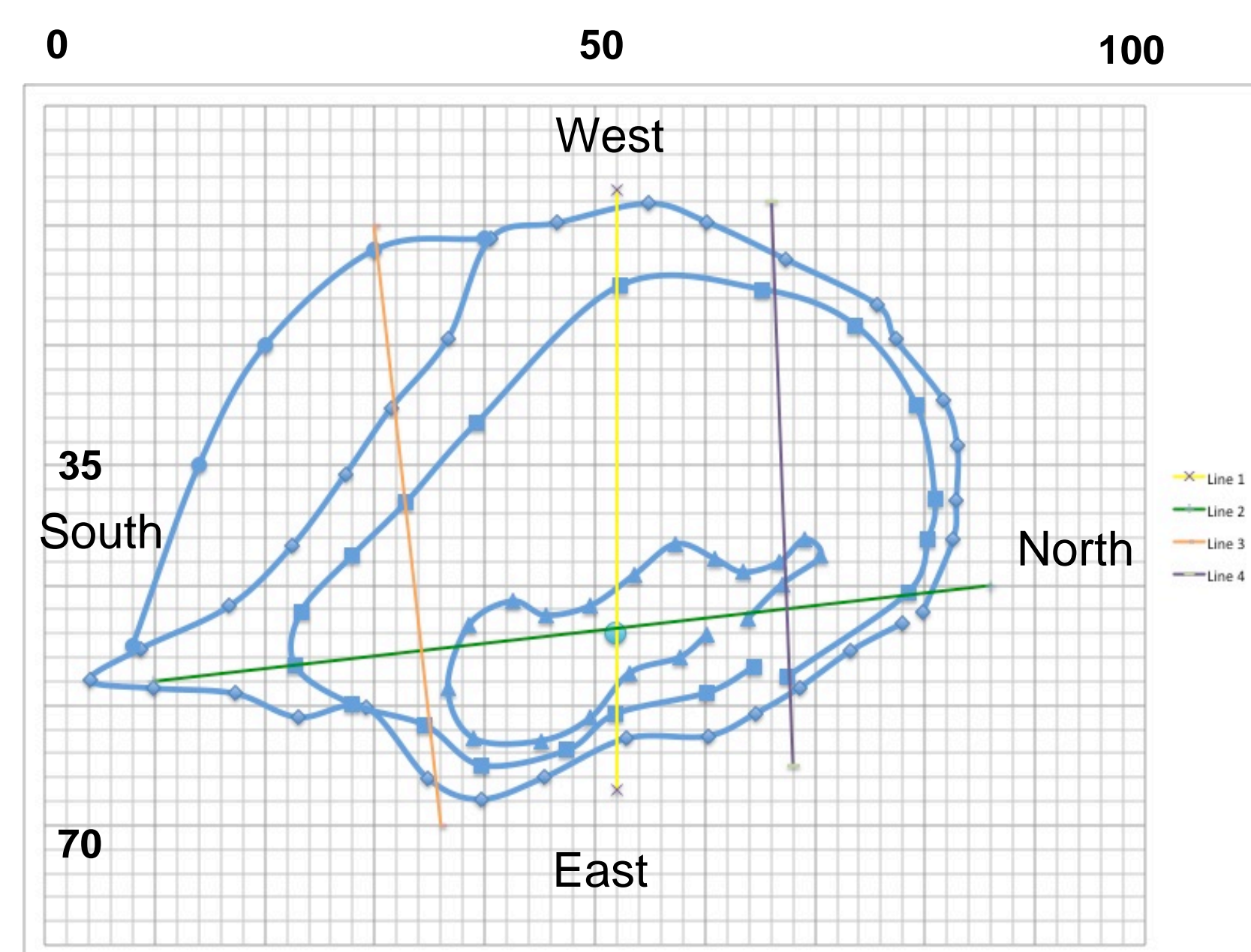


Figure 3. Aerial view of wetland site.

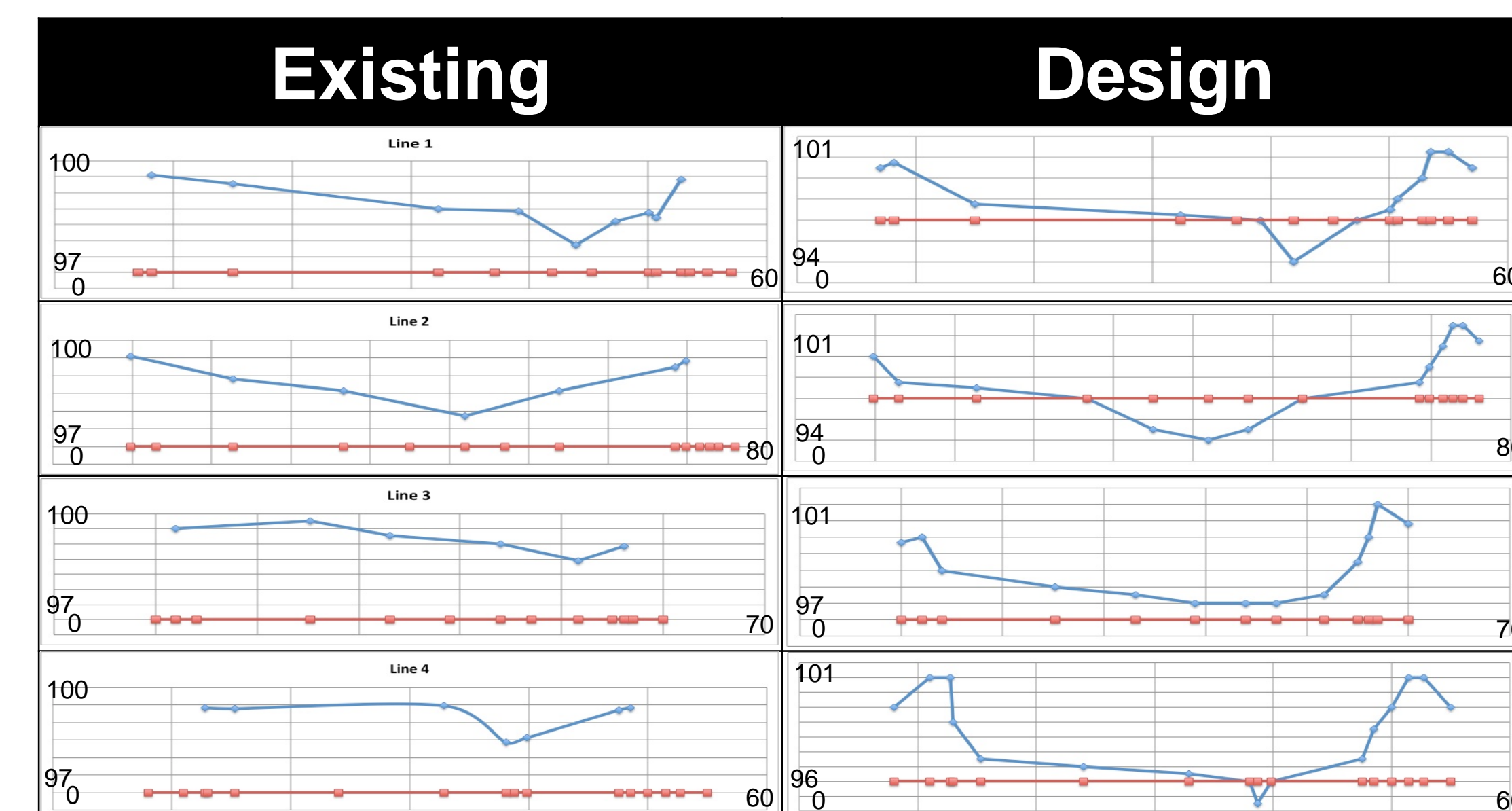


Figure 4. Profile views of wetland corresponding to Figure 3.

Site Models:

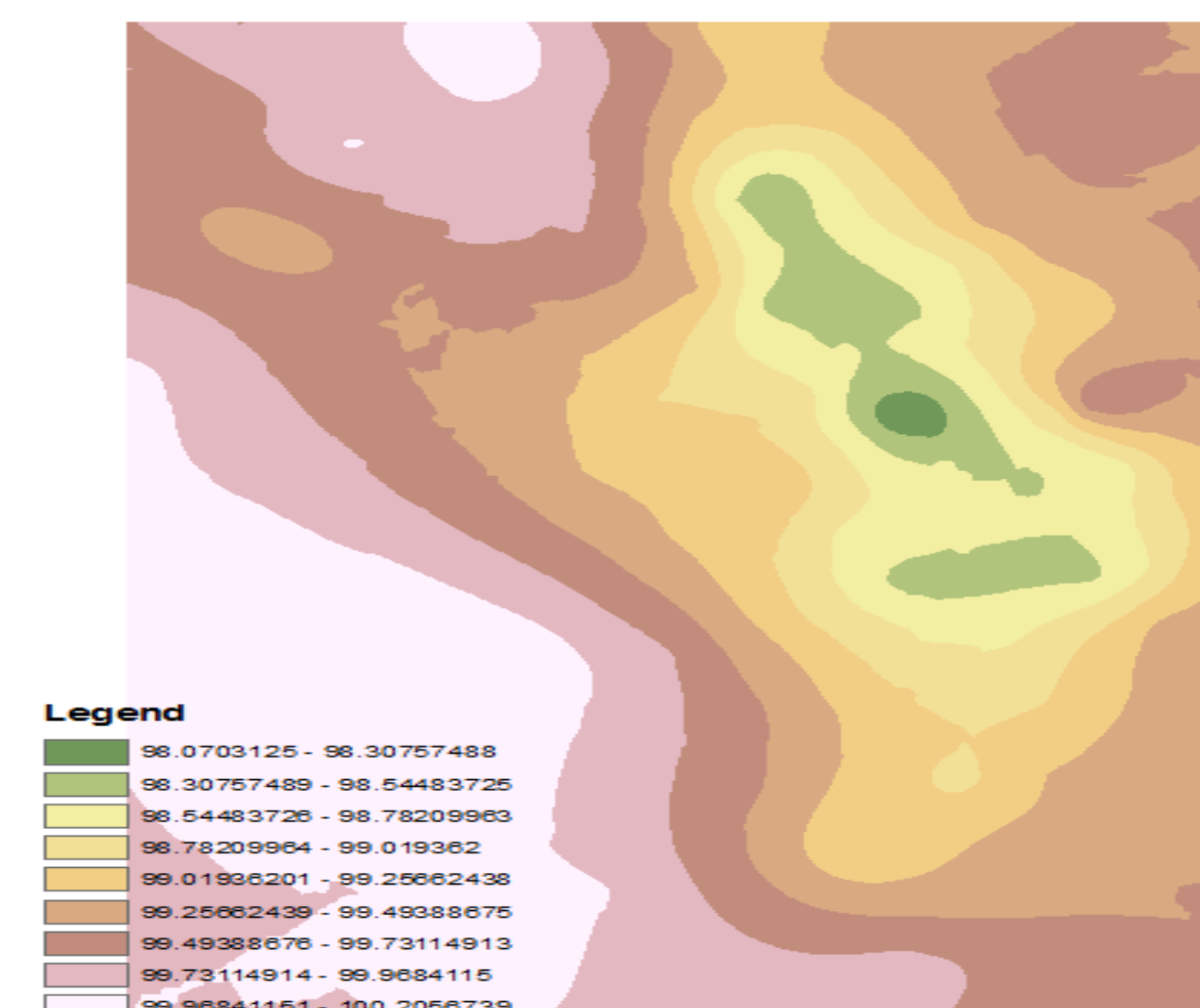


Figure 5. Contour of site before design.

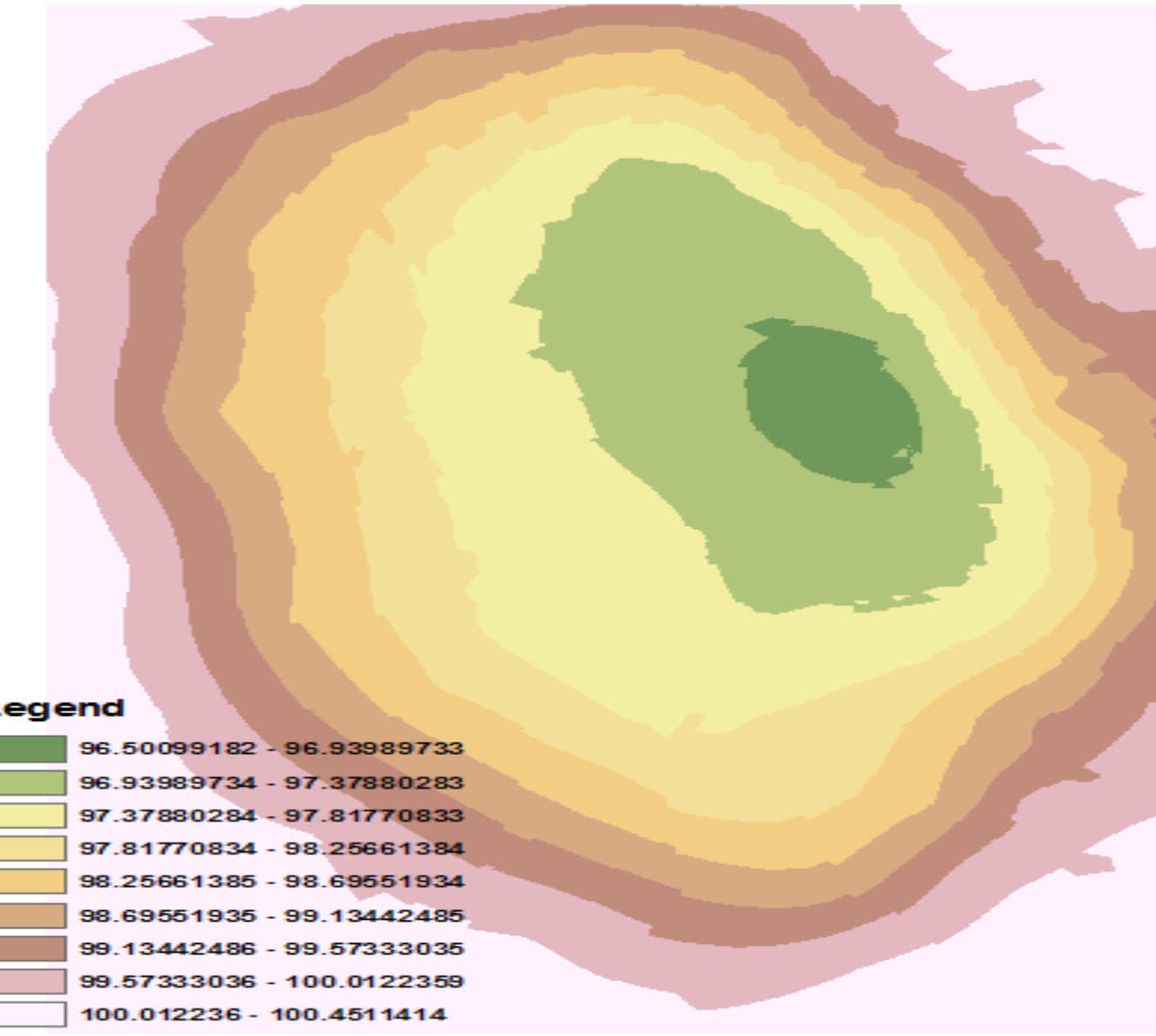


Figure 6. Contour of site after design.

Design Components:



Figure 7. Site after a storm event.



Figure 8. Flashboard riser.

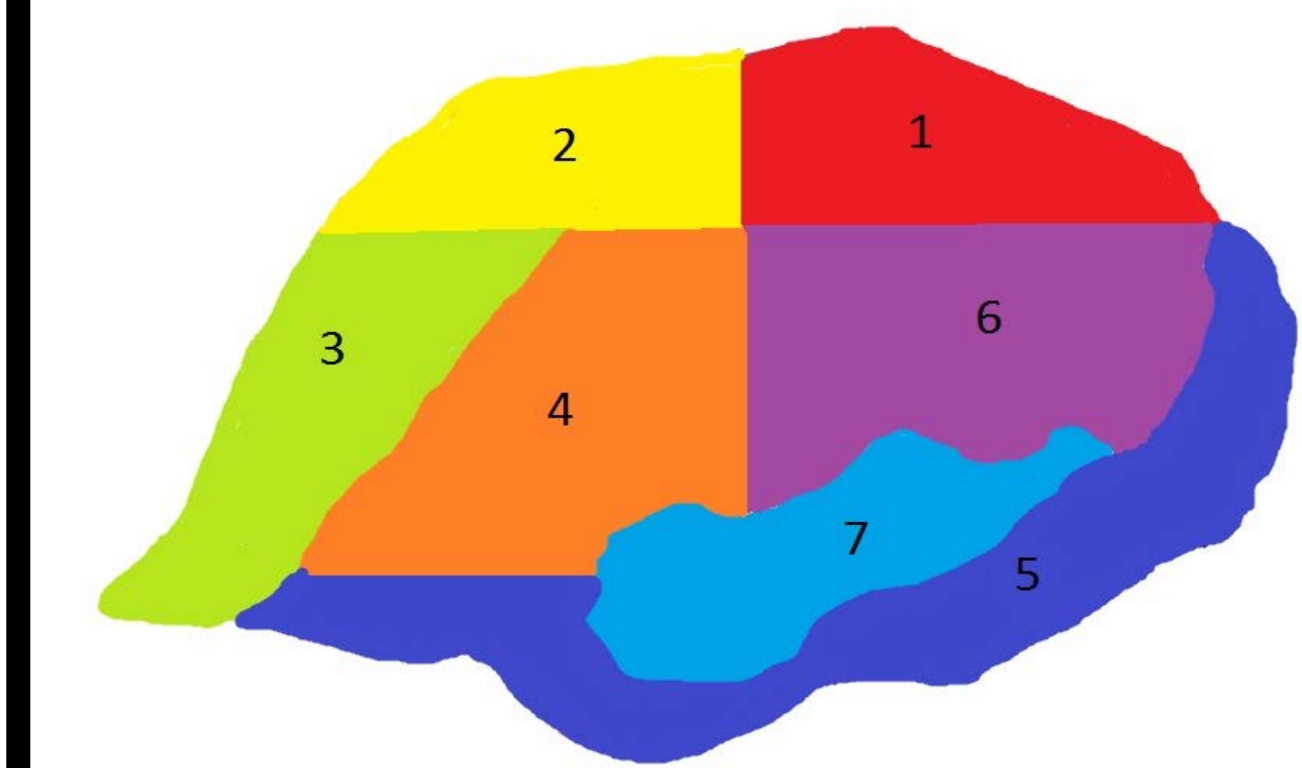


Figure 9. "Clump pattern" for wetland vegetation with corresponding plant species. Species 1-3 are facultative, species 4-6 are obligate. Section 7 is the permanent pool.



Wetland

- Manages storm water
- Provides ecological services
 - Decreases mosquito population
 - Improves water quality
 - Restores natural habitat
 - Controls honeysuckle population
- Prevents erosion
- Aesthetic improvement

Outlet Flow

- Flashboard riser
 - Adjustable spillway height
 - Dissipates energy
 - Controls overflow
- Overflow channel
 - Avoids subsurface excavation
 - Less expensive
- Culvert at accessible road

Vegetation

- Wetland will be planted in a "clump pattern" to allow for:
 - ease of maintenance
 - locating different plant species

Budget:

Item	Estimate
Excavation	\$4800 (\$100/hr @ 48 hrs)
Vegetation	\$3500 (~1 plant/sq ft @ \$2.50/plant)
Outlet (Weir & Subsurface Drainage)	\$1750
Shed/Tree Removal	\$3750
Misc. (e.g., wildlife, signage, fencing)	\$3400
Total	\$17,200

Timeline For Completion:

	Fall		Spring	
	1st Half	2nd Half	1st Half	2nd Half
Surveying/Watershed Delineation	X	X		
Storm Water Calculations		X	X	X
Outlet and Wetland Sizing		X	X	X
Vegetation Selection			X	
WREC Proposal		X	X	

Societal Impacts/Sustainability:

- WREC Cost Share Program
 - Funds improvements to storm runoff management in the community
 - Covers up to 75% of costs
- Educational tool for local middle school
- Boy scout project cooperation
- Responsibly maintain water quality into the Wabash River for future generations



Design Assumptions:

- Wetland
 - 2-year, 24 hour design storm event
 - ~3 acre watershed
 - 10-12in depth to water table
 - Water quality focus
- Outlet culvert
 - 10-year, 24 hour design storm event
 - ~3 acre watershed
- Flashboard riser
 - 2-year, 24 hour design storm event
 - ~3 acre watershed
 - Peak flow of 2.55 cfs

Constraints:

- Available area
- WREC
 - Application deadline
 - Fundable solutions
 - Project completion within 1 year of submission
- Grace United Methodist Church
 - Budget
 - Man hours
 - Volunteer availability

Alternative Solutions:

- Versus wetland
 - Tiling
 - Grassed waterway
 - Rain garden
- Versus outlet culvert
 - Dry well
 - Grassed waterway
- Versus flashboard riser
 - Underground piping
 - Box drain

Sponsor:
Lore Gibson
Laura Bowling, Ph.D.

Technical Advisor:
Sara McMillan, Ph.D., PE
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Instructors:
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Robert Stwalley, Ph.D., PE

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