

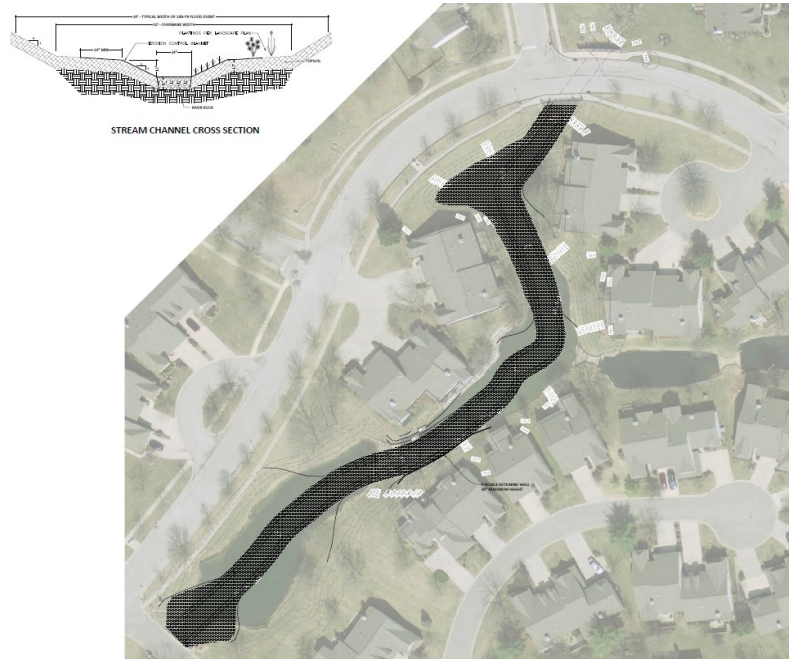
Hydrologic/Hydraulic Study Highlights

In 2019 WFCM contracted with Bledsoe Riggert Cooper and James to conduct a **Preliminary Hydrologic/Hydraulic Analysis** for 100-year Peak Flow = 333 cubic feet per second and a drainage Area = .239 square miles.

Conceptual Design & Channel Hydraulics Summary

A channel would be created between the culverts at Winslow Farm Drive and Moss Creek Drive. The average gradient would be achieved by

- removing the concrete control structure (*weir*) at the downstream end of Pond 3,
- and distributing the roughly five feet in vertical grade change over the 650-foot length of the channel



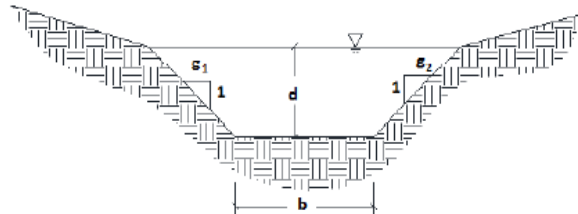
To accommodate a 100-year flood, such as what we have recently experienced, a channel with a 10' bottom width and 3:1 side slope would be created in the current P3 area.

Open Channel Flow

Manning's Equation for Open Channel Flow

Project Name: Winslow Farms - Pond 3 & 4
 Project No. 10058
 Designed By: AEK
 Date: 2019-04-48
 Description: Channel at 100-yr Capacity

DATA SHEET 1



$$Q = \frac{1.49}{n} A R_h^{2/3} S^{1/2}$$

b = 10.00 ft base width of channel
 g₁ = 3.00 ft side slope of channel
 g₂ = 3.00 ft side slope of channel
 d = 2.50 ft depth of channel
 S = 0.77 % longitudinal slope of channel

<p style="text-align: center;">RECOMMENDATIONS FROM THE HYDROLOGICAL STUDY</p>	<p style="text-align: center;"><i>Comments from Practical Proposal Authors</i></p>
<p>Conceptual Grading Plan and Flood Extents: “Results indicate that it does appear feasible to construct a channel through Ponds 3 and 4 that would avoid flooding of any existing structures (around pond 3 and 4).”</p> <ul style="list-style-type: none"> • While most of the earth moving involved in constructing such a channel would be filling in the existing ponds, the weir between Ponds 3 and 4 will need significant alteration/removal. • The new channel flow line would be roughly 3.5 feet lower than the existing level of Pond 3 at the weir. As a result, retaining walls may be required to shore up the decks and patios at 709/713 Moss Creek Circle, and at 600/604 Winslow Farm Drive. • River cobbles having maximum diameter of 4 - 5 inches could be used in the flow line of the channel. Larger material such as boulders or riprap may be appropriate where steps or drops may occur in the channel profile, or at constrictions, culverts, retaining walls, etc. • Other vegetative erosion control measure such as willow fascines and live staking may also be applicable. • Channel banks could be stabilized initially with erosion control blanket (ECB) which will degrade once the vegetation is established. ECB composed of coconut fiber with netting is capable of handling shear stress of up to 2.25 lb/ft² 	<p><i>The study does conclude that the topography and the necessary width between the units make a stream channel feasible. However, note the comments highlighted in bold as there are significant considerations to ensure that the stream channel functions effectively.</i></p>
<p>Recommendations for Further Study</p> <ul style="list-style-type: none"> • Additional analysis and hydrologic modeling are recommended to verify the drainage area and peak flow estimated. • It should be noted that an additional topographic survey will be required to advance this design beyond the conceptual stage. • Local utility infrastructure should be evaluated, relocations may be necessary for the construction of the channel. • The karst geology should be investigated and evaluated with respect to the existing impermeable liners and whether they should remain in place or be removed with the construction of a stream channel. • Geomorphic analysis of the existing channel upstream of Winslow Farm Drive will be needed. • The ponds and culverts downstream of Pond 4 should be evaluated with respect to their capacity to carry the 100-year flow and how backwater effects may impact the channel design. • Permitting strategy should be discussed with representatives of the U.S. Army Corps of Engineers (USACE) and Indiana Department of Environmental Management (IDEM) 	<p><i>Take note of the recommendations for the need for further studies to convert pond 3 and 4 to stream channel. Each study has the potential of costing thousands of dollars. The report makes it clear that this is a preliminary report and additional investigation is required. Of particular interest is the comments that the utilities may need to be relocated, and an analysis is needed to ensure flooding upstream (Olde Mill area) will not occur with this design.</i></p>