

Responses to Questions on the WFCA Pond Improvement Conceptual Report.

Responses by A.Knust, in red, below.

May 14, 2021

1. I'm having trouble visualizing the recommendations in 3.12 and 3.13 (p. 7) about Shoreline Restoration and Sediment Forebays. Might you be able to show some illustrations to help me understand?

A. The illustrations linked below are a good reference:

<https://www.everything-ponds.com/media/wysiwyg/anchoring-large-pond-liners.jpg>

My recommendation would be similar to the "Anchor Shelf" except that the area shown as "Fill, dirt, sand, gravel" would be topsoil wrapped in an erosion control blanket and planted with native species. It may also be possible to retro-fit the speed bump or perforated pipe method at current locations of severe shoreline erosion without replacing the entire liner.

2. In the Stream Channel Restoration model, it seems not only that the water level in the channel would fluctuate, but also overflows would occur intermittently, the water reaching out in some cases to the present perimeters of Ponds 3–4. In that conception, how would landscaping be handled around the channel? Would not the whole area surrounding the channel need to be planted—and maintained—as something like a big rain garden, in order to keep the area from looking like a weedy slough?

A. Yes, recommended plantings would be very similar to a rain garden. Many native species are adapted to environments that are periodically inundated. Below is an example planting schedule from another project in Bloomington:

swamp milkweed	<i>Asclepias incarnata</i>
Sullivant's milkweed	<i>Asclepias sullivantii</i>
riverbank tussock sedge	<i>Carex emoryi</i>
Frank's sedge	<i>Carex frankii</i>
meadow sedge	<i>Carex granularis</i>
porcupine sedge	<i>Carex hystericina</i>
fox sedge	<i>Carex vulpinoidea</i>
bottle gentian	<i>Gentiana andrewsii</i>
swamp rose mallow	<i>Hibiscus moschoetos</i>
blue flag iris	<i>Iris virgnica shrevei</i>
wild iris	<i>Iris versicolor</i>
spiked blazingstar	<i>Liatris spicata</i>
cardinal flower	<i>Lobelia cardinalis</i>
great blue lobelia	<i>Lobelia siphilitica</i>
soft-stem bulrush	<i>Scirpus validus</i>
showy goldenrod	<i>Solidago speciosa</i>
shining aster	<i>Symphiotrichum firmum</i>
smooth ironweed	<i>Vernonia fasciculata</i>
culver's root	<i>Veronicastrum virginicum</i>
golden alexanders	<i>Zizia aurea</i>
palm sedge	<i>Carex muskingumensis</i>
fox sedge	<i>Carex vulpinoidea</i>
purple coneflower	<i>Echinacea purpurea</i>
cardinal flower	<i>Lobelia cardinalis</i>

blue lobelia	<i>Lobelia siphilitica</i>
common water horehound	<i>Lycopus americanus</i>
monkey flower	<i>Mimulus ringens</i>
ditch stonecrop	<i>Penthorum sedoides</i>
obedient plant	<i>Physostegia virginiana</i>
Virginia mountain mint	<i>Pycnanthemum virginianum</i>
showy black-eyed susan	<i>Rudbeckia fulgida</i>
prairie dropseed	<i>Sporobolus heterolepis</i>
Ohio spiderwort	<i>Tradescantia ohiensis</i>

3. Assume that you lived at 604 E. Winslow Farm Drive on pond 3 in Moss Creek. Knowing what you do now about the waterways in Winslow Farm, which option would you pick? Pond improvements or Stream channel restoration?

A. **Personally, I would go for stream restoration - I enjoy free flowing stream channels more than ponds, and the environmental benefits are pretty clear. This system was all stream channels before it was dammed up and ponds were created. Stream restoration would provide more opportunity for native planting, less need for pumping, dredging, & high impact maintenance.**

4. These are two very different proposals. We have been working to maintain the ponds for years. If the WFCA “restores” the ponds to their original “like new” state, will this be a permanent upgrade or will be revisiting pond upgrades again in the coming years?

A. **The ponds will require continuous maintenance, dredging, pump repairs, aeration systems, etc. However, making the ponds deeper will help reduce the recurring costs and increase the success of maintenance.**

5. If WFCA instead restores the creek bed to its original state, I assume that the ongoing cost of maintenance of the creek bed will be much less than the cost of pond maintenance.

A. **Yes, the cost of ongoing maintenance will likely be less for a restored stream channel, once the native plantings are established. However, there will always be maintenance needed to keep invasive plant species under control.**

6. That said, what are the implications of restoring the original creek bed? Will WFCA then have to deal with flash flooding of the creek bed every time it rains?

A. **No, the occurrence of flooding downstream will be very similar whether the ponds remain or get rebuilt as stream channel.**

7. Will units down-stream from the current mouth of the stream be subject to flash flooding?

A. **No, downstream units will be at no increased risk. Upstream units may be at a slightly increased risk, but this can likely be mitigated through careful design at the culvert tailwater.**

8. Will future homeowners be required to buy flood insurance?

A. **No, this is not a regulated floodplain. There is no requirement for flood insurance.**

9. Will I be able to get a personal response?

A. **At your service, sir!**

10. The pond levels rise and fall significantly depending on recent rainfall. Will the dredging and replacement of the liner significantly retain water, so that we do not have the continual exposure of the

banks and liner during dry spells? I am particularly concerned about this after reading the plans would deepen the ponds, as that would require even more water to keep them filled.

A. Exposure of the liner along the banks is primarily due to bank erosion, which would be addressed by the recommended bank stabilization work. Once the ponds are full (and any leaks in the liners are repaired) it will take no more water to keep them full, regardless of the depth. The volume of the pond below the overflow/spill elevation is fixed. After the water level drops below the spill elevation, the only loss of water would be due to evaporation or leaks in the liner. To keep the ponds full during dry spells, I recommend use of the well pump at Pond 5.

11. Do surveys indicate how much of the banks have been lost over the years? That is, how much bigger have the ponds grown due to bank erosion over the years? Anything significant? I haven't looked carefully at this, but historic surveys are not likely accurate enough to determine extent of bank loss.

And will bank restoration impact that? Bank restoration may extend shoreline back into the ponds - as long as the bank is not too steep below the water level. Refer to discussion of the "Anchor Shelf" and "speed bump", above.

I think that is an issue back on Pond 2 where erosion is encroaching on those nearby condos. Pond 2 is not the subject of this report. Armor flex mat was installed on that shoreline, resulting in different issues...

12. What will the work--particularly the dredging--have on existing wildlife? The ducks can relocate, but the turtles and fish cannot.

A. It may be possible to capture and relocate some turtles and fish, but draining ponds, replacing liners, etc. would certainly be bad for them in the short term. However, deeper ponds would be good for wildlife in the long term, providing better habitat.

13. That is a LOT of money, and many of us who don't live near the ponds will be wondering if the Moss Creek associations will be footing a larger portion of the cost, since they will get the most direct benefit in terms of property value.

A. No comment.

14. I am hopeful that the bank restoration will turn out better than what happened at Pond 1, as that looks a mess--more like a SuperFund retention pool than a neighborhood pond.

A. Pond 1 and 2 had armorflex installed directly over the steeply sloping liner with little opportunity for topsoil and vegetation to take root. I would propose flattening out the liner above the static water level and installing flat lifts of fabric wrapped soil that can be vegetated.

15. I am hopeful, too, that the recirculation and aeration will help control algae, which is very heavy this year.

A. Yes, that is the purpose of these systems.

16. I hope the board leans toward the stream channel option; maintaining large ponds seems too costly in the long run, particularly as our summers get drier and hotter.

A. Stream channel restoration would likely be less maintenance long term.

17. Since charts are provided to address various flood events, for comparison sakes, was the flood of February 2019 considered to be a 10-year or 100-year flood event?

A. Yes, the Feb, 2019 flood event was comparable to a 100-yr event.

18. Page 13 recommends a sequence of steps for project implementation that indicates among other

things a topographic survey and a bathymetric survey. Does this report provide such information?

A. **No. this report is based on Statewide LiDAR topography which has a resolution of +/- 2 feet. The historic depth measurements from 2008 are the only bathymetric data provided to me.**

19. For Scenario #1 and #2: The report provides an analysis of the existing liners to recommend that a flat “bench” needs to be created around the perimeter when each pond is drained to allow the edge of the liner to be “folded back, covered with soil and then planted with native flowering species”. Is there a list of recommended species being provided, as previous attempts to introduce such have not shown much success?

A. **I am no expert on native plants, but can recommend Eco Logic, LLC. If we move forward on any of these projects, I would bring them in to provide planting recommendations. An example planting schedule prepared by Eco Logic for a different project in Bloomington is included above.**

20. For Scenario #2-Stream Channel Restoration, the report acknowledges that ponds #4, 5 and 6 are all on the same plane. One assumes that there is little to no decline in elevation from one to the other. The scenario indicates that pond #4 would be converted to a stream but 5 and 6 will remain as ponds. How will water be prevented from backing up/pooling in #4? **It wouldn't.**

Of most concern, will there be the potential for the creation of a muddy/weedy area at the end of pond #4 before emptying into pond #5?

This is a major concern as we do not want to recreate a situation of a muddy weedy mess. It is assumed that the vertical gradient change from #3 to #4 will not be a problem.

A. **Good question. This is a potential concern. To reduce the likely area of backwater at the end of the stream channel in Pond 4, you could put more fill into P4, raising the profile of the channel and have a steeper drop going into the culvert, similar to the proposed boulder drop at current location of the P3 overflow/spillway structure. The potential consequence would be further loss of flood storage volume in the area of P4 and potential impact to downstream peak flow. It may also be able to use perforated piping underdrains (e.g. field tile) to help dry out the overbank/floodplain areas in P4.**

21. For Scenario #2-Stream Channel Restoration it is understood that the trapezoid slopes required to direct rain and run-off will need to be somewhat steep. It is recommended that they will be “wrapped in coir mat erosion control fabric, anchored with live willow or dogwood stakes, seed native flowering species.” Will this be as difficult to maintain and/or unsightly as the current flexamat used on ponds #1 and 2? **I believe it would look nicer, and certainly more natural, but will require some maintenance. Refer to discussion of native plantings and controlling invasive species, above.**

Will this discourage weeds and other invasive water plants such as cattails? **The fabric should discourage weeds & invasives, but maintenance would be required, especially for the first few years while it gets established.**

22. This next question is directed to WFCA and Moss Creek HOA—but who will be responsible for maintaining this “dry land” area? Will this be a source of contention?

A. **Consider contracting with a local expert in controlling invasive species. Eco Logic would be a great place to start. Much of the work can also be done by residents. MC-IRIS <http://mc-iris.org/> is a great resource for organizing volunteer groups.**

23. Scenario #1: From the report, it appears that the ponds need to be deeper. Considering that it is reported that karsts exist under the ponds and there is a need to line the ponds to prevent possible sink holes, is there any danger to making the ponds deeper?

A. **Deeper ponds would have new liners installed to prevent interaction with the karst... liners would still be necessary.**

24. Scenario #1: It is understandable that a recirculation of the water would be beneficial to the quality of the ponds. Given that the electrical line has been cut, would solar power an option for the pump and/or aerators.

A. Solar may be an option for aeration systems, particularly a diffused system, but the recirculation pump would likely be too large for solar power.

25. Shouldn't pond #1 be the location to pump the water rather than #3? --or better yet to both! (The explanation for #3 was based upon the problem with primrose that seems to be addressed with chemical applications.)

A. Ideally, yes, the recirc. system should pump to Pond 1. I was informed that the recirc. system was shut off due to Primrose concern, preventing it from reaching P1 and P2. If it can be effectively controlled with chemicals then I recommend pumping to P1. The Pond 3 outlet is just another possible option to consider.

26. Pond #5. Little was recommended concerning pond #5 besides the statement to "evaluate well & pump system for continued use as a supplemental water supply to pond 5. Repair as needed." Pond #5 (though actually just an extension of 4 and 6) is the smallest pond. However, it is creating serious erosion problems for the homeowner, is unsightly and prone to invasive vegetation. Since both scenarios recommend that it remain as a pond, should there be more detailed recommendations as to how to attractively address the erosion problem?

A. The recommended bank stabilization & revegetation treatment should prevent erosion on the banks. If a more aggressive approach is desired, riprap could be used.

27. Are there any attractive water plants, such as water lilies, that can cover the surface to "choke" out or at least "cover up" the less attractive vegetation?

A. I don't know, please ask a plant expert.

28. Will the stream recommended in Scenario #2 provide enough water to pond #6 to maintain its current water level, or will it drop to a much lower level? (Since there is a weir between #6 and 7 and the outlet for #7 will not change, it is assumed that pond #7 will maintain its status.)

A. With a stream channel restoration, the net inflow/outflow to Ponds 6 and 7 would not be significantly different than it is now. There would be less water lost to evaporation in P3-P4, but this may be offset by more water taken up by vegetation. Deeper ponds would help keep water somewhat cooler, decreasing evaporation. Overall I would not expect much change. Replacing liners may be the best way to keep ponds full!

29. On page 9 of the report the proposed "high flow" channel section indicates that a bottom width of 16' be created. However, the hydrological report from April 9, 2019 indicates a 10' bottom for the "high flow". Which is the correct figure and is there enough ground between the units on the south end of pond #3 to allow a bottom of 16'? (There is also a discrepancy for the "low flow" channel between the two documents.)

A. The 2019 document is superseded by the newer 2021 document. The objective of the 2019 document was to demonstrate that a channel with sufficient capacity for a 100-year event could be created through P3 and P4. The 2021 conceptual design has refined the grading plan and the channel cross section represents the narrowest point near the south end of P3 where there is 16' of floodplain width. This is the channel cross section that was analyzed using the more sophisticated SSA H&H model.

30. Both scenarios recommend that ponds #5, #6 and #7 remain as the current ponds. However, the cost to restore those ponds are considerable higher in Scenario #1 (Pond Restoration) than the

recommendations for Scenario #2 for the Stream Bed. Why would they differ if they are to remain as ponds? The explanation is that Scenario #1 recommends digging them deeper and replacing the old liner. Whatever is good for them in Scenario #2 should suffice for Scenario #1.

A. Deepening the ponds and replacing the liners would be much better for P6 and P7 than simply vac-dredging and leaving the old liners in place. I provided an estimate for both methods so that the board could make an informed decision about which way to go. As stated in the report, the recommendations can be mixed and matched based on the WFCAs budget and priorities to create projects to move forward on.

31. The resulting cost differences could influence the final decision. The chart is as follows:

	Restore (Scenario #1)	Stream (Scenario #2)	Questioned
pond 3	\$131,000.00	\$221,000.00	\$131,000.00
pond 4	\$85,000.00		\$85,000.00
pond 5	\$61,000.00	\$77,000.00	\$61,000.00
pond 6	\$95,000.00	\$68,000.00	\$68,000.00
pond 7	\$127,000.00	\$65,000.00	\$75,000.00
total	\$499,000.00	\$431,000.00	\$420,000.00

Additionally, a cost of \$10,000 is listed for “sediment forebay, annual maintenance by Vector Truck” as part of the redesign estimate. It should probably be noted separately as the cost would not be incurred at the time of installation. Yes, I wanted to put it in the estimate so that you could get an idea of annual maintenance needed at the forebays.

This goes back to another question as to how many forebays are being recommended and what are the long-range maintenance costs.

32. Were the costs of installing boulders or other structural items to address erosion issues included in the cost estimates?

A. Bank stabilization is included. I only recommend boulders as a drop structure between P3 and P4.

33. In the estimates for Scenario #2 Stream Bed:

- Was the cost to obtain an engineer included? No. Engineering and survey fees are not included.
- Will there be additional costs for the required permits, and if so, were they included in the estimates? No. Engineering and survey fees are not included. Permit fees would run just a few hundred... unless the proposed project would cause mitigation to be required by IDEM and/or USACE... then in-lieu mitigation fees could be quite large.
- The issue of how to stabilize the banks was addressed, but did this include the costs of “landscaping” as recommended? Yes. Seed and Live Stakes @ \$30/SY
- Was the cost of removing/cutting the weir between ponds #3 and #4 included? Yes. "Remove Concrete Spillway" 100 CY @ \$30/CY.
- Will cutting the concrete weir weaken the existing retention wall and require structural reinforcements and/or replacements? Was this included in the costs? A new retaining wall is proposed. Cost is included @ \$27,000.

34. What does the second paragraph on page 12 mean and are there implied costs to responding to “evaluating the existing aquatic habitat...for several years?”

A. Compensatory mitigation is frequently required for projects that impact regulated WOUS. If you were constructing new ponds on this stream channel today, WFCAs would be required to pay a pretty

hefty fee for the stream channel habitat that would be lost. Since the proposed stream channel would do the opposite, effectively restoring the habitat that was lost in 1992 when the ponds were created, there would be no mitigation fee. However, the stream channel needs to meet certain standards, and yes, it would take more study and monitoring to evaluate habitat, deal with permitting, and pay for all of that.

35. According to the *Plan Notes on the Conceptual Design Plan Scenario #2* the ponds are to be excavated another 2-5 ft deep. The first few steps listed are the same as Scenario #1. Is this correct?

A. Yes, but only at P5. P6 and P7 would be vac-dredged - see Plan Note 6.

36. The Plan Notes suggest the using a “floating suction dredge. Contractor to protect in place existing pond liner.” In previous attempts to locate contractors to work on the ponds. One contractor was identified that uses a floating dredge. That contractor felt the WFCAs ponds too small to be interested in the project. Are you able to recommend such a contractor?

A. Heartland Dredging is the only one I know of off-hand. There may be others near the Ohio River. It may be easier to get a contractor interested if more ponds are addressed simultaneously.

37. For Scenario #1 Restore the Ponds:

- It was recommended that the depth of the sediment should be measured before excavation is done. Was the cost of obtaining such included in the estimates? No.
- Was the cost to evaluate and/or repair the pump in pond #5 included in the estimates? Yes: "Replace pump in supplemental water supply well"
- Was the option of installing a solar system considered to operate the recirculating pump and/or aeration systems? Yes, briefly. Solar may be a viable option for diffused aeration, but recirc. pump is likely too large.
- On the list of items provided in the diagram “*Conceptual Design Plan Scenario 1: Pond Restoration*”, item 9 is “install valves and piping for alternate recirculation discharge location to pond #3.” Will this preclude the recirculating water to not be returned to pond #1? No. Valves would allow water to discharge at either P1 or P3.
- Is there a forebay to be installed at the north end of pond #3, as well as, pond #5? No. The forebay would be in P3 in Scenario 1, only. It would go in P5 in Scenario 2, only.

38. With regards to the addendum entitled *Moss Creek Exhibit* as part of the *Deckard Land survey conducted 10/25/2007*, were there any additional pages for the Moss Creek properties?

A. Not that I'm aware of.

39. With regards to the addendum of your report submitted to the WFCAs Pond Committee on April 9, 2019, on page two you wrote: ...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. Does this remain your opinion?

A. No. I believe the properties will be fine, but there is utility infrastructure - transformers, pull boxes, etc. that need to be protected on the south side of the P3 weir.

40. What is the methodology for estimating the costs to dredge and replace liners?

A. I called a pond liner manufacturer and installer. Dredging estimates are based on typical industry unit costs for earthmoving.

41. How do these compare to the costs WFCAs has paid to dredge ponds 1, 2, 3? Has any material been removed in ponds 4 and 5 recently?

A. I'm not aware of the costs for recent work at P1, 2, 3. I'm not aware of any dredging work at P4-6.

42. With all the water that is funneled into the pond system, that was not funneled into any creek that ran through the property, why is it a good idea to change the design to revert to creeks when we know the current system handled high water well?

A. The proposed stream channel design takes into account the entire watershed and all of the development, impervious area, etc. contributing to the channel. Some might argue how well the current system handles high water - consider flooding and erosion around P3. All in all, the overall performance of the system during large flood events would not be significantly different in either of the proposed scenarios.

43. Why is it “assumed” that the water is at the level of the starting static level equal to the spillway elevation. Does this exclude from modeling the benefit of factoring detention of stormwater in ponds that are usually below that level?

A. Yes. The volume below the spill way is already full of water, so there is no available volume to fill up below the spillway... sometimes water level is below the spillways, but recommended management would be to use the groundwater well to keep them full at least to spill elevation.

44. The modeling for 2, 10 and 100-year events uses approximate dimensions, diameters and does not consider the active detention storage capacity of ponds that are most of the time below the spillways. Even with all those accommodations, the creek restoration design only has modest increases in the 100-year flood event model and is very close or negative in 2 and 10 years. So how much time and money will WFCMA have to spend to determine if changing the design of the system will not negatively impact handling all the water that is funneled through the property?

A. This would be part of the construction document design phase, for which a complete topo survey and refined engineering analysis would be performed. The preliminary modeling I have completed so far gives us a substantial head start on the next stage of analysis, and gives me confidence that a stream channel could be constructed through P3 and P4 without increasing the risk of property damage.

45. The restored creek scenario indicates water would overflow the channel, onto the fill placed on the liners, which would be covered with degrading erosion mats. How good is this going to look?

A. I recommend that the entire area is vegetated with native flowering species suited to this habitat. You will see the vegetation, not the liners or the mats.

46. What kind and amount of maintenance will be required to make it look attractive?

A. It will require maintenance, largely weeding, removing invasive species, occasional mowing.

47. Why is periodically soaking land with shallow and pooling water not a breeding ground for mosquitos?

A. Ideally, the water would soak into the ground, and standing water would not persist long enough for mosquitoes to breed. Perforated underdrains could be installed to help drainage. How are mosquitoes controlled in the existing ponds?

48. Will the area be a hazard to any children or people who decide to go on the area that is soaked regularly with bacteria-rich pond water?

A. I probably wouldn't recommend ingesting the soil, but otherwise there is no more hazard than with the existing ponds - probably less.

49. How long would work on pond 5 have to wait if we spend all this money to reconstruct the areas where ponds 3 and 4 are?

A. The most efficient approach would be to dredge P5 at the end of the P3-P4 stream restoration project, allowing P5 to capture sediment generated during construction.
I can't comment on WFCMA budgeting and spending priorities.

50. In either of the two proposals, would there any factor being advised that might increase development of sinkholes in the underlying karst bedrock?

A. The pond liners would remain in place, protecting the improvements from interaction with the karst.

51. Are there any feasible storm drain pipe systems that could be used that might facilitate burying the ponds and waterways so that the constant erosion problems are finally dealt with?

A. As an engineer I have to say that yes, one could put in a pipe big enough to handle all the flow... however, this proposal would almost certainly cost a lot more than the scenarios analyzed in the report, and would be looked upon as a negative impact to the water resource by IDEM and USACE. Very large mitigation fees would likely be imposed.

52. Is the inflow to Ponds 1 and 2 coming from storm "drainage piping directed from Winslow Sports complex and Highland Avenue" a significant amount?

A. There is some flow coming from this direction, about 12 acres total drainage area... but it is small relative to the 131 acres draining into Pond 3.

53. How would you compare the maintenance cost for all ponds, after rehabilitation, with Scenario 1 vs. Scenario 2?

A. I believe that maintenance cost would be reduced in either scenario (after the projects are completed) as compared to the "no action" alternative. Once plantings are established, I believe that maintenance cost in the Scenario 2 - stream channel would be less than Scenario 1.

54. Do you have any estimate of the yearly maintenance cost for all ponds, with each scenario?

A. I have included an estimate for annual vacuum dredging at the forebay, but otherwise, no.