

East Branch Starkweather Creek Phosphorus Treatment Project City of Madison

Frequently Asked Questions

1. Why is the City proposing this project?

Phosphorus from stormwater runoff (both urban and agricultural) is a major source of nutrients that contributes to algae blooms in Lake Monona and all the Madison lakes. Decreasing phosphorus from all sources, including stormwater in Starkweather Creek, will help reduce the severity of algae blooms in Lake Monona. The City of Madison (like all the municipalities in the Yahara Lakes' watershed), is under state and federal regulations to reduce phosphorus from the city's storm sewer system. Madison is required to reduce about 14,000 pounds of phosphorus per year. The proposed Starkweather Creek project alone will remove about 1,600 pounds of phosphorus.

Reducing phosphorus by this amount is expected to have a significant impact on the water quality of Starkweather Creek and will also help achieve cumulative phosphorus reductions to improve Lake Monona water quality over the longer term.

2. Why was this particular site selected?

The City of Madison investigated many potential sites for the project. The best project site required several criteria including: 1) large open space, 2) a location that received runoff from a large watershed (the larger the watershed, the more phosphorus that can be treated), and 3) would not impact existing park lands. The selected site meets these criteria, plus: 1) the site has an existing pond that can be used to settle out the trapped phosphorus, and 2) the site has limited land development potential and can serve other functions for the City and the public.

3. How will the treatment system work?

The proposed treatment system would consist of the following components:

- 1) When a rain event occurs a diversion structure automatically moves to partially block flow in the East Branch of Starkweather Creek and an automatic gate opens to divert runoff water into a 48" pipe which leads to the treatment system.
- 2) Only a portion of Starkweather Creek will be diverted into the treatment system. The channel both upstream and downstream of the diversion will never be dry. Flow not diverted into the treatment system will continue downstream.
- 3) The diversion pipe leads to an underground chamber where a coagulant is added and mixed with the stormwater.
- 4) After the mixing chamber, the treated stormwater is discharged to the treatment pond.
- 5) The coagulant binds to phosphorus (and other pollutants) to form large particles called *floc* which settles to the bottom of the pond.
- 6) After the particles to settle, the top layer of water from the pond is pumped back into Starkweather Creek.
- 7) All treatment takes place outside of the Starkweather Creek itself.
- 8) After the rain event is over, the diversion gate closes and no water is diverted until the next rain event.

4. How much phosphorus will the project remove?

Extensive water testing and watershed modeling was conducted during the Phase I study. Measured rainfalls from Dane County Airport over a ten year period were used in a computer model to estimate the

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amount of runoff that would occur from the watershed. Also, water monitoring was conducted with a variety of coagulants to determine how much phosphorus could be removed from Starkweather Creek water during rain events. The Phase I study reports:

- 1) On an average rainfall year, the system will treat about 3,500 acre ft. of runoff per year. (That's over 1.1 trillion gallons/year).
- 2) The coagulant treatment process can remove an average of 85% of the total phosphorus in the treated water.
- 3) That means about 1,660 pounds of total phosphorus will be removed on the average year.

In a study conducted by Dr. Richard Lathrop and Dr. Stephen Carpenter for the Yahara CLEAN project, it was reported that the long-term average annual phosphorus loading to Lake Monona from direct runoff (not including the contribution from Lake Mendota) was 16,535 pounds/year. The proposed treatment system on the East Branch of Starkweather Creek could reduce the direct drainage phosphorus loading to Lake Monona by about 10%.

5. What coagulant will be used and can chemicals get into Lake Monona?

Based on testing conducted during Phase I of the project, it was found that the most effective and environmentally protective coagulant, was Aluminum Chlorohydrate (ACH) at a dose between 4.0 and 5.0 mg/L.

ACH is a coagulant used everyday throughout the US in public drinking water systems. Any chemicals used in the treatment system must meet all Wisconsin Department of Natural Resources requirements. The floc which is formed to trap the phosphorus will settle in the pond and not be discharged back to Starkweather Creek. The design of the system includes monitoring equipment to shut the inlet gate and turn off the pond's outlet pump if the treatment system is not functioning properly. The floc at the bottom of the pond will be removed as needed, dewatered on-site, and the dried material will be disposed of in accordance with state and federal regulations.

6. How much will the project cost?

Preliminary cost estimates were developed in Phase I of the study. Although there are project details yet to be resolved, the Phase I study reported the following cost estimate information:

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| 1) Total construction costs (<i>land costs not included</i>): | \$ 5,566,900 |
| 2) Annual operation and maintenance cost: | \$ 351,000 |
| 3) 20 year life cycle cost/pound phosphorus removed: | \$ 380/pound |

7. When will the project be built?

The project schedule calls for:

- 1) Further testing and design through 2017,
- 2) Construction could begin in late 2018,
- 3) Project could be on-line in 2019 but more likely active treatment could begin 2020

8. Who can I contact for further information?

Questions should be directed to: Greg Fries, City of Madison Engineering
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