

September 29, 2026

Mr. Brad Marquardt, P.E.
City of Whitewater
312 West Whitewater Street
Whitewater, WI 53190

Re: Well No. 5 Filter Failure Project Alternatives
City of Whitewater, Wisconsin (City)

Dear Brad,

On August 19, 2026, while reviewing and assisting the City in diagnosing the cause of increased sand in the distribution system around the Starin Park Water Treatment Plant (WTP), it was discovered that there was an apparent failure in the Well No. 5 filter system. The purpose of this letter is to describe the failure of the filter vessel, review the history of the site, present potential alternatives for the site from short- and long-term perspectives, and summarize a potential project schedule.

Summary of Well No. 5 Filter Failure

Figure 1 shows the Well No. 5 underdrain system, and Figure 2 shows a photograph looking down into Filter Cell No. 4 of the filter vessel. As shown in Figure 1, there is a large amount of filter media located throughout the underdrain system and a large pile located at the end of the filter vessel below Filter Cell No. 4. In Figure 2, gravel is visible along the filter wall separating Filter Cell Nos. 3 and 4. The filter media in Filter Cell No. 4 is also approximately 24 inches lower than the filter media in Filter Cell No. 3.



Source: Strand

Figure 1 Filter Underdrain



Source: Strand

Figure 2 Filter Cell 4 Sidewall

Mr. Brad Marquardt
City of Whitewater, Wisconsin
Page 2
September 29, 2026

Since the failure was discovered, the City has removed the media from the entire filter vessel and cleaned the interior of the filter. Mid-City Corporation inspected the interior of the vessel. Figures 3 and 4 show the weld failure and condition of the underdrain plate.



Source: Mid-City Corporation

Figure 3 Failed Cell Wall and Underdrain Plate Weld Seam



Source: Mid-City Corporation

Figure 4 Underdrain Plate Pitting

The inspection reviewed the following conditions.

- The underdrain plate throughout all four cells has significant pitting and is in poor condition.
- The tank walls appear to be in fair condition with moderate pitting.
- The filter vessel has significant staining and it does not appear the interior wet of the tank has a coating.

Starin Park WTP Site History

This site currently houses Well Nos. 5 and 7, and both wells are routed to the Starin Park WTP. Well No. 5 is located immediately outside the WTP and pumped to the WTP, while Well No. 7 is located a few thousand feet north of the WTP and pumped to the WTP.

The WTP site history includes the decommissioned Starin Park Elevated Tank, constructed in 1889; the recently demolished Starin Park Ground Level Reservoir, constructed in 1889; and several iterations of well and WTP facilities. The WTP has had several modifications and additions in 1949, 1972, and 1996 to add or modify treatment at the WTP for separate treatment systems of Well Nos. 5 and 7.

The *Well No. 7 Modifications Preliminary Design Report* prepared by Strand Associates, Inc.® (Strand) in May 2023 reviewed the Starin Park WTP and had the following comments:

- There are portions of the facility that are more than 75 years old, and an entire WTP replacement should be considered in the future.

Mr. Brad Marquardt
City of Whitewater, Wisconsin
Page 3
September 29, 2026

- The Well No. 5 filter vessel is approaching its anticipated service life, and replacement may be required between 2029 and 2049.
- The WTP generator and chemical rooms do not meet the Wisconsin Department of Natural Resources (WDNR) Codes Natural Resources (NR) 811.27(1)(a) and NR 811.51(2)(a), respectively.
- The WTP generator is original to the 1972 construction and is past its anticipated useful service life.
- The WTP electrical equipment is 28 years old, which has an anticipated useful service life of 30 years.

Given the current conditions and review performed in 2023, the entire site should be considered when reviewing alternatives for repairing the Well No. 5 filter vessel.

Project Alternatives

A. Planning Considerations

Given the age of the condition of the filter vessel and facility, the City should began planning for a full facility replacement in the next 5 to 10 years. The City's last Utility Master Plan was prepared by Strand in 2017. Strand and WDNR recommend performing a water system master plan every 10 years; therefore, the next water system master plan is due in 2027. That plan should include a more comprehensive review of the entire water system and review the long-term outlook of the Well Nos. 5 and 7 WTP.

B. Anticipated Long-Term Project Alternatives

While the upcoming 2027 water system master plan should include a comprehensive review of each alternative, at a minimum, the following alternatives should be considered.

1. Alternative No. 1–Filter Vessel Replacement Only

Alternative No. 1 considers only replacing the existing filter vessel and not providing any modifications or replacements of the existing WTP. Because the existing filter system does not have automatic valves, a filter control panel, or an airwash system for the backwash, some new features would be anticipated. This scope of work for this project includes the following components:

- Temporarily bracing the structure and creating an opening to remove the existing vessel
- Removing the existing filter vessel.
- Installing a new filter vessel with pneumatic valves, air blower, air compressor, and filter control panel.
- Accommodating mechanical, electrical, and plumbing modifications necessary to complete work.

This alternative could be expanded to include replacing equipment and electrical gear within the entire WTP, but depending on the extent of modifications and replacements that are included, additional building code and WDNR requirements could be triggered, which would further expand this project and project cost. If additional work is included in this alternative, it could impact operation of Well Nos. 5 and 7 at the same time, so system needs and construction sequencing would also need to be reviewed to determine viability of adding scope to this alternative.

Mr. Brad Marquardt
 City of Whitewater, Wisconsin
 Page 4
 September 29, 2026

2. Alternative No. 2–Partial Well No. 5 Facility Replacement

Alternative No. 2 considers leaving the northern portion of the building, which includes the maintenance garage, chemical room, administrative area, and Well No. 7 treatment plant, in place and replacing only the southern half of the WTP, which includes the Well No. 5 filter area and generator. The viability of this option should be reviewed in the upcoming 2027 water system master plan. The following items should be reviewed before pursuing this alternative:

- To what extent will the WDNR make the City modify nonconforming features anticipated to remain that do not currently meet WDNR code?
- How will Well No. 7 remain in service during the construction project? Electrical for Well No. 7 is fed through the southern portion of the building and finished water for Well No. 7 is routed through the southern portion of the building.
- What features and equipment should be replaced within the Well No. 7 facility?

This alternative could be expanded to include replacing equipment and electrical gear within the entire WTP, but depending on the extent of modifications and replacements that are included, additional building code and WDNR requirements could be triggered, which would further expand this project and project cost. Similar to Alternative No. 1, simultaneous impact to the operation of both Well No. 5 and 7 during construction is possible and should be considered.

3. Alternative No. 3–Starin Park WTP Facility Replacement

Alternative No. 3 considers constructing a new WTP immediately west of the site where the old Starin Park Reservoir was recently demolished. Well Nos. 5 and 7 could remain online and in service during construction, and only a short shutdown for each well would be required to tie into the new building. This facility would include the following features:

- WTP Filtration Systems for Well Nos. 5 and 7
- Separate Chlorine and Fluoride Rooms
- Standby Power
- Electrical and Mechanical Rooms
- Office Space
- Bathroom
- Storage Room

C. Anticipated Long-Term Project Alternatives Summary

The upcoming 2027 water system master plan should include comprehensive review of each alternative to review Opinions of Probable Construction Cost (OPCC), present worth evaluation, and project viability. The project unknowns for Alternative Nos. 1 and 2 are significant, as such, the confidence in the OPCC is low. Table 1 in the following summarizes preliminary OPCC and project durations for each alternative.

Mr. Brad Marquardt
 City of Whitewater, Wisconsin
 Page 5
 September 29, 2026

	Low OPCC	High OPCC	Project Duration
Alternative No. 1–Filter Vessel Replacement Only	\$2,000,000	\$3,000,000	2 to 3 years
Alternative No. 2–Partial Well No. 5 Facility Replacement	\$5,000,000	\$10,000,000	3 years
Alternative No. 3–Starin Park WTP Facility Replacement	\$9,000,000	\$14,000,000	3 to 4 years

Table 1 Long-Term Project Summary

Given that the proposed alternatives have a project duration of approximately 3 to 4 years and the City needs Well No. 5 in operation to allow them to meet its current system demands and maintenance needs of other facilities, the City needs to also consider immediate, short-term options that allow Well No. 5 to be put back into service until a long-term solution can be implemented.

Short-Term Alternatives

There are two short-term alternatives the City can consider for putting the Well No. 5 filter back into service.

1. Alternative No. 1–Underdrain Repairs: The first alternative includes the following project components.
 - a. Repair the failed weld seam in Filter Vessel Cell No. 3.
 - b. Provide support welds along the underdrain plate and cell walls in all four cells.
 - c. Surface prepare and coat the entire interior of the filter vessel.
 - d. Provide new filter media.
2. Alternative No. 2–Underdrain Replacement: The second alternative includes the following project components.
 - a. Remove the underdrain plate in its entirety.
 - b. Surface prepare and coat the entire interior of the filter vessel.
 - c. Provide a concrete underdrain system designed by filter manufacturer.
 - d. Provide new filter media.

Alternative No. 1 has the lowest OPCC but has the highest risk. There two main risks include:

1. The underdrain plate is in poor condition and has excessive pitting. Surface preparing and coating this underdrain plate will provide some benefit; however, many pits are larger than recommended to be filled with a coating. Typically, large pits are steel filled and then coated, but there are too many deep pits for this to be cost viable, especially for a short-term solution.
2. The weld repair and bracing along the entire underdrain plate and cell wall interface should help prevent the failure that occurred in Cell No. 3 from happening again in the rest of the filter; however, with the condition of the underdrain plate, the extent that this preventative support and bracing helps is unknown.

Mr. Brad Marquardt
 City of Whitewater, Wisconsin
 Page 6
 September 29, 2026

With this the City would hope to get 3 to 5 years out of this repair before implementing one of the long-term project alternatives. The contractors that Strand has discussed this project with said that they would not provide a warranty on the repair work for this option, so while 3 to 5 years would be a good goal, this alternative does carry risk the City would need to consider.

Alternative No. 2 has a higher OPCC, and it eliminates the two main risk factors present in the first alternative, but it is not a common fix and the long-term viability of the solution is unknown. The City would hope to get 5 to 10 years out of this repair and a contractor's 1-year standard warranty should be incorporated into the project.

Table 2 includes the project summaries and anticipated project costs for both alternatives. The OPCC also include the costs that have already been spent on filter media removal and disposal and inspection of the vessel, but they do not include engineering services.

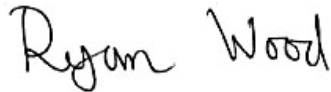
	Low OPCC	High OPCC	Project Duration
Alternative No. 1–Underdrain Repairs	\$190,000	\$240,000	2 to 3 months
Alternative No. 2–Underdrain Replacement	\$300,000	\$390,000	3 to 6 months

Table 2 Short-Term Project Alternatives Summary

Please call 608-251-4843 if the City would like to discuss these alternatives in more detail or if additional information would be helpful as the City considers next steps for the Starin Park WTP.

Sincerely,

STRAND ASSOCIATES, INC.®



Ryan D. Wood, P.E.

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