



**Department of Public Works
Engineering Division**
W240 N3065 Pewaukee Road
Pewaukee WI 53072
Phone: 262-691-0804

**PUBLIC WORKS COMMITTEE
MEETING NOTICE AND AGENDA
Thursday, April 23, 2026
4:00 PM**

Pewaukee City Hall Common Council Chambers
W240N3065 Pewaukee Road, Pewaukee, WI

1. Call to Order and Pledge of Allegiance
2. Public Comment - Please limit your comments to two minutes. If further time for discussion is needed, please contact your District Alderperson prior to the meeting.
3. Discussion and Action Regarding the Minutes
 - 3.1 Discussion and possible action to adopt Mar 05 2026 meeting minutes.
4. Storm Water Management Division
 - 4.1 Discussion and possible action regarding the 2025 MS4 Annual Storm Water Report.
5. Water and Sewer Division
 - 5.1 Discussion and possible action regarding Proposals to Conduct Groundwater Well Siting Study
 - 5.2 Discussion regarding an Excerpt-AWWA Beyond the Replacement Era: Balancing Compounding Infrastructure Needs With Household Affordability
6. Public Comment - Please limit your comments to two minutes. If further time for discussion is needed, please contact your District Alderperson prior to the meeting.
7. Adjournment

Magdelene Wagner
Director of Public Works
April 23, 2026

NOTICE

It is possible that members of other governmental bodies of the municipality may be in attendance to gather information that may form a quorum. At the above stated meeting, no action will be taken by any governmental body other than the governmental body specifically referred to above in this notice.

Any person who has a qualifying disability under the Americans with Disabilities Act that requires the meeting or materials at the meeting to be in an accessible format must contact the DPW Main Office at (262) 691-0804 by 12:00 p.m. the Tuesday prior to the meeting so that arrangements may be made to accommodate your request.

City of Pewaukee - New Agenda Item

Agenda Language:

Discussion and possible action to adopt Mar 05 2026 meeting minutes.

Sub Item Agenda Language:

Background Provided By:

Background:

Draft minutes for the March 05, 2026 meeting are attached for your review and approval.

Fiscal Impact:

Recommended Motion:

Committee approve the minutes.

In Attendance:

Mayor Steve Bierce, Alderman Jerry Wamser, Michael Kreiter, Jim Blackwood

Also In Attendance:

Director of Public Works M. Wagner, City Engineer M. Gabbey, Chief Engineer—Utilities R. Wirtz, Utility Manager J. Mueller, Utility Assistant Manager R. Kincaid, Administrative Assistant H. Jacobs

1. Call to Order and Pledge of Allegiance

Mayor Bierce called the meeting to order at 4:00 p.m. and called for everyone to stand for the Pledge of Allegiance.

2. Public Comment - Please limit your comments to two minutes. If further time for discussion is needed, please contact your District Alderperson prior to the meeting.

There were no public comments.

3. Discussion and Action Regarding the Minutes

3.1 Discussion and possible action to adopt Jan 22 2026 meeting minutes.

Motion was made and seconded (M. Kreiter, J. Blackwood) to approve the January 22, 2026 meeting minutes. The motion passed unanimously.

4. Water and Sewer Division

4.1 Presentation and Discussion Related to Ehlers 2025 Sewer Rate Study Phase 1.
[Wagner/Mueller]

Ms. Mueller presented information about the Ehlers sewer rate study, which had been presented to the Common Council the previous month. The study evaluated the Utility's current financial condition and identified the need for a rate increase in 2026.

Ms. Mueller explained that the Utility has begun drawing on its reserve funds and emphasized that Ehlers standard of practice follows a philosophy of maintaining a 1.4 debt coverage ratio. This means the Utility should generate \$1.40 in revenue for every \$1.00 of debt, ensuring both debt obligations are met, and adequate reserves are maintained. Ms. Mueller noted that, without a rate increase, reserves will continue to

decline. She also highlighted that recent rate increases from the Lake Pewaukee Sanitary District (LPSD) and the City of Waukesha have compounded the need for this financial strategy.

Restoring the Utility to long-term fiscal stability remains a priority, with careful consideration given to both financial sustainability and the potential impacts on community members.

Phase 1 of the study confirmed the need for rate increases. Phase 2 will determine developing specific rate structures, with recommendations to be brought back to the Council. The goal is to implement new rates by June 2026.

Mr. Blackwood asked whether the 1.4 ratio is standard practice. Ms. Mueller confirmed that Ehlers applies this guideline across all municipalities it serves. She added that the Council could consider a stepped approach to implementing the rate increases if there is concern about the immediate impact, allowing for continued use of reserves.

Mr. Blackwood also inquired about the current coverage ratio and noted the substantial projected increases of 14.7% annually over four years—totaling nearly 60%. Alderman Wamser expressed concern about the burden such increases would place on residents who are not receiving comparable wage increases.

Ms. Wagner emphasized the importance of considering that sewer rates have remained unchanged since 2021, while many residents have experienced wage increases during that period. She also pointed out that LPSD has implemented nearly double-digit rate increases over the past three years—costs that are outside the City's control. Additionally, the City of Waukesha also had significant increases after the City of Pewaukee adopted its current rates.

Ms. Wagner noted that previous attempts to create different rate zones were not feasible due to state statutes requiring uniform rates across the service area. The discussion also touched on frustrations with regulatory constraints and their impact on Utility costs.

Ms. Mueller clarified that while the projected increases are not driven by any single major capital project, but rather by a range of anticipated infrastructure needs included in the study. While some projects may ultimately proceed and others may not, the 1.4 coverage philosophy provides for ongoing infrastructure needs. She also noted that a significant portion of the City still lacks municipal sewer service, and future septic relief plans could result in additional capital projects.

The Committee acknowledged the inevitability of infrastructure replacement costs, referencing the recent Gun Club lift station replacement as an example of necessary but costly improvements. Ms. Mueller confirmed that the Council has requested rate comparisons from other Waukesha County communities for future meetings. Ms. Wagner added that the City of Pewaukee's system's spread-out nature with areas separated by unsewered land results in higher per-capita costs compared to more compact communities.

4.2 Presentation and discussion related to SEWRPC Sanitary Sewer Service Area Update. [Mueller/Wagner]

Ms. Mueller provided an update on the City's work with Southeastern Wisconsin Regional Planning Commission (SEWRPC) regarding the sewer service area plan. She explained that SEWRPC had previously allowed communities to make smaller regional amendments to their sewer service plans; however, due to the length of time since the last comprehensive update, SEWRPC has decided against processing individual amendments.

In response, the City has requested that SEWRPC conduct a comprehensive review of the remaining unmapped areas within the City. Ms. Wagner clarified that this effort specifically includes the Ryan Road area, which is currently not mapped by SEWRPC's plan despite being included in the Brookfield treatment plant's capacity calculations.

This mapping is essential for obtaining WI Department of Natural Resources (DNR) approvals for any future development. This process will involve SEWRPC reviewing environmental areas throughout the community and consulting with the adjacent communities. Ms. Mueller noted that this effort is expected to take a minimum of one year to complete.

Ms. Wagner further explained there is a developer interested in the area known as Winklemann Farms for potential industrial development. SEWRPC is aware of this interest and has indicated a willingness to work with the City to accommodate potential approvals ahead of the full plan update, depending on project timing.

The developer's progress to date has been inconsistent, facing multiple hurdles. Originally, sewer service to the area was expected to be provided through the Kopmeier lift station; however, the City has since been working with the Village of Pewaukee to identify a new, more efficient connection point that would require fewer infrastructure upgrades.

Ms. Wagner noted that while some sewer upsizing will still be necessary, the extent of those improvements will not be known until further studies are completed. The developer has not been willing to fund these required studies to date.

Alderman Wamser asked about notification requirements to neighboring communities. Ms. Mueller confirmed that, as a part of SEWRPC's process, notification letters were sent to surrounding communities last summer. Two rounds of letters were completed, and no communities requested amendments to their respective plans.

5. Engineering Division

5.1 Discussion and possible action regarding the Intergovernmental Agreement Between the City of Pewaukee and Waukesha County Regarding the Municipal Recycling Dividend Program. [Wagner]

Ms. Wagner provided a comprehensive overview of the recycling program's history and current challenges. Waukesha County has served as the designated responsible unit for recycling for 25 communities, including the City of Pewaukee, since 1990.

From 2015 until May 2023, recycling was processed at a joint Materials Recovery Facility (MRF) co-owned by Milwaukee and Waukesha County.

A fire in May 2023 gutted the entire facility, making it financially unfeasible to restore operations. The county subsequently dissolved its agreement with Milwaukee and issued a Request for Proposal for recycling processing services, which was awarded to Waste Management. All recycling is now processed at Waste Management's facility in Germantown.

Ms. Wagner noted that the new facility is highly automated and efficient, noting it was recently upgraded in 2021-2022. The county requested that all communities execute updated Intergovernmental Agreements (IGAs) to reflect the new location and revised provisions.

However, several concerning changes were made to the agreement. The original IGA included language stating that if recycling needed to be taken to another location with additional costs, the county would cover those costs. This language was removed, with the county asserting that its contract with Waste Management covers all processing costs and that communities are included under the term "county."

Ms. Wagner expressed concern with this interpretation and requested either reinstatement of the original language or explicit inclusion of municipalities in the cost coverage provision. The county declined both requests.

A second concern involved the county's control over working capital limits. The county maintains a floor and ceiling limit with a \$400,000 range. If the balance falls below the floor, communities will be charged tipping fees; if it exceeds the ceiling, communities receive dividend payments based on recycling tonnage. The county retains authority to adjust these limits without community consultation, despite Ms. Wagner's request for a subcommittee process to review and justify such changes.

Ms. Wagner also requested greater transparency regarding the county's education program and budget. While the county agreed to share educational information, they refused to include this commitment in the IGA. Similarly, requests to include budget transparency language were denied, with the county directing communities to its website instead.

Throughout approximately a year of discussions, Ms. Wagner stated that the county was uncooperative and took advantage of the fact that state law provides no opt-out mechanism for communities designated under a responsible unit in 1990. Communities are required to deliver recycling to the county regardless of whether they sign the IGA.

The IGA primarily serves to designate the delivery location and establish the dividend program, which the county claims is unique nationally. However, the City of Pewaukee has not received dividends for several years, and Ms. Wagner does not anticipate any in the near future based on current market conditions. She noted that communities may eventually be required to pay tipping fees for recycling.

Despite these concerns, Ms. Wagner recommended approval of the IGA to maintain eligibility for potential future dividends, as communities that do not sign would forfeit

that opportunity.

Alderman Wamser expressed frustration with the situation, comparing it to communities that simply landfill everything rather than deal with recycling complexities. Ms. Wagner acknowledged the program's benefits, noting Waste Management's efforts to find markets for difficult materials such as plastic bags and its acceptance of #4 plastics, which were not processed at the previous facility.

She highlighted City of Pewaukee's strong recycling performance, with a residual rate of 12% compared to the national average of 30%, demonstrating effective community participation and county messaging. Ms. Wagner praised Waste Management's ongoing efforts to find new markets for recyclable materials but reiterated her disappointment with the county's unwillingness to cooperate or address community concerns.

The Committee acknowledged it had no real alternative given state law requirements.

Motion was made and seconded (J. Wamser, J. Blackwood) to recommend approval of the Intergovernmental Agreement between the City of Pewaukee and Waukesha County regarding the Municipal Recycling Dividend Program.

The motion carried unanimously.

6. Public Comment - Please limit your comments to two minutes. If further time for discussion is needed, please contact your District Alderperson prior to the meeting.

There were no public comments

7. Adjournment

Motion was made and seconded (J. Blackwood, M. Kreiter) to adjourn the meeting at 4:34 p.m. The motion passed unanimously.

Respectfully Submitted

Magdelene Wagner
Director of Public Works

City of Pewaukee - New Agenda Item

Agenda Language:

Discussion and possible action regarding the 2025 MS4 Annual Storm Water Report.

Sub Item Agenda Language:

Background Provided By:

Magdelene Wagner/Richard Wirtz

Background:

As required by our NR216 Permit, the City creates an annual report. This is referred to as our Annual MS4 Report (MS4 = Municipal Separate Storm Sewer System). This report summarizes activities for our permit compliance for the year. The report is a lengthy one and the Council previously requested a summary report. Attached you will find the summary report. The full report may be viewed on the City's website at <https://www.cityofpewaukee.us/218/Storm-Water-Management> and scroll to the bottom and click on 2025. (If the link does not work, the full report is located on the City's website under Departments, Public Works, Storm Water Management then scroll near the bottom under Reports and click the year 2025.)

Fiscal Impact:

Recommended Motion:

No action is required.



Department of Public Works
Engineering Division
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Memorandum

To: Magdelene Wagner, P.E.
From: Richard J. Wirtz, P.E., CFM
Subject: City of Pewaukee Annual MS4 Report for 2025
Date: March 31, 2026

As in previous reporting cycles, we are providing a brief summary report and supporting data to be posted on the City's website and provided to members of the Public Works Committee and Common Council which briefly describes the major components of the City's permit, the measurable goals of these components, the results achieved during the reporting year and any recommended changes to the programs. If you are interested in viewing the full report, please go to the City's website at <https://www.cityofpewaukee.us/218/Storm-Water-Management>. This summary report along with the information provided in Attachments B through E were submitted to the WDNR along with the City's eReport. A copy of the 2025 eReport filed with the WDNR is attached at the end of the summary report as Attachment A.

Highlights from the 2025 reporting period included:

- The WDNR has been developing TMDL and waste load allocation for the Illinois/Fox River. The draft TMDL report and waste load allocations have been completed. The two pollutants of concern are Total Suspended Solids (TSS) and Total Phosphorous (TP). Based on the draft report, the City will be required to reduce TP by 58% and TSS by 29.7%.
- City staff and consultants performed 724 erosion control inspections, issued five Notices of Noncompliance, issued eight Notices of Violation, and recommended \$9500.00 dollars in fines to the Sheriff's office during the reporting period. City staff spent an estimated 696 hours conducting inspections, reviewing plans and enforcing the City erosion control ordinance.
- The City currently owns 17 Best Management Practices (BMP's), of which 13 were inspected at least once during the reporting period. Additionally, City staff conducted 2 inspections of privately owned BMP's. City staff time to review storm water management submittals and inspect BMP's accounted for approximately 401 hours.
- Highway crews applied approximately 2100 tons of salt and 3380 gallons of salt brine to City streets through the end of February for the 2025-2026 winter season. This results in an average application of 11 tons of salt per lane mile for the winter season so far. This is 1.8 tons more than the previous winter season.
- Highway crews removed 30.9 tons of material from approximately 57 inlets and catch basins, repaired

Director Magdelene Wagner, P.E.



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26 storm sewer structures, cleaned 1118 feet of roadside swales, and swept 2405.1 lane miles of streets removing 64.4 tons of material.

- Approximately 1069 tons of yard waste was collected at the City Recycling Center drop off site and by the City's waste hauler and taken to Johnson's Nursery LLC for composting/recycling.

City of Pewaukee - New Agenda Item

Agenda Language:

Discussion and possible action regarding Proposals to Conduct Groundwater Well Siting Study

Sub Item Agenda Language:

Background Provided By:

Jane Mueller/Rob Kincaid

Background:

Last year, the Water Utility conducted the Water Supply Alternatives Analysis to determine how the City of Pewaukee will provide safe and affordable drinking water to the community, now and into the next 30 to 50 years.

The Common Council directed staff to continue to look at two options for the drinking water source: 1) request a Great Lakes Surface Water Diversion. 2) Continue to support the groundwater supply.

Staff recently met with two hydrogeologic consultants who conduct well siting throughout Wisconsin to discuss our current and future water supply needs for the community.

INTERA Incorporated — Mr. Pat Jurcek, P.G. senior hydrogeologist
COLLIER Geophysics - Dr. John Jansen, P.G. Ph.D., principal hydrogeologist

Both hydrogeologists have experience siting wells in southeast Wisconsin and Waukesha County. Dr. Jansen has sited wells for the City of Pewaukee in the past as well as a recent well siting for the Village of Pewaukee.

The City requested that the consultant identify at least two well sites. The City provided the previous 1995 Regional Reconnaissance Study to use as a basis for their reports. They will update the reports with new data sets that have been compiled since the original study was conducted. Illustrations of the location of major bedrock formations, fracture traces and regional aquifers will be incorporated into the report.

INTERA Incorporated Proposal:

1) Data Collection	\$ 3,580
2) Photo-lineament Analysis	\$ 5,560
3) Delineation of Potential Contaminant Sources	\$ 5,975
4) Evaluation of Cambrian Deep Sandstone Potential Well Sites	\$ 5,530
5) Inventory of Potential Contaminant Sources	\$ 5,770
6) Report preparations	\$14,950

Final Project Cost Estimate \$41,365

COLLIER Geophysics

Phase 1- Updating the 1995 report and maps including gravity data to help determine favorable locations for sandstone aquifer wells. Use available data to identify two well sited to meet City;s immediate needs. \$20,000

Phase 2- Evaluate the Feasibility of Developing a Regional Wellll Field in the Rock Bedrock Valley. \$17,500

Project Cost Estimate \$37,500

Should the City wish to continue to pursue the Groundwater study, additional field work will need to be conducted to see if these sites are viable. Additional anticipated reconnaissance costs:

*Geophysical exploration-electrical resistivity tomography (ERT), time domain electromagnetic conduction (TEM) and/or seismic refraction tomography (SRT).

Determined by the # of samples needed \$30,000 - \$50,000

*Test boring and test wells-boring and drilling tests conducted of favorable sites to confirm capacity and quality of water available.

Determined by the # of well sites \$50,000 - \$100,00 per site.

Fiscal Impact:

Recommended Motion:

Public Works Committee recommends that the Common Council approve the proposal from COLLIERS Geophysical to prepare a Well Siting Study for the City of Pewaukee for a cost not to exceed \$37,500.



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www.collierconsulting.com

April 20, 2026

To:
Rob Kincaid
Assistant Utility Manager
City Of Pewaukee Water and Sewer Utility

Via email : kincaid@pewaukee.wi.us

Re: Proposal to site two municipal wells and evaluate the feasibility of developing a regional well field

Dear Mr. Kincaid:

Thank you for contacting us to discuss siting two new municipal wells for the City of Pewaukee (the City). As we discussed, the City of Pewaukee is interested in developing additional sand and gravel or dolomite aquifer wells within their projected service area, if possible. The City is also interested in siting one or more sandstone aquifer wells to pair with any shallow well developed or to provide the needed capacity if no shallow well sites can be found. The City is also interested in looking at options for a regional water supply and would like to determine if there is the potential for a regional water supply from a bedrock valley aquifer located just west of the City. This proposal outlines an approach to evaluate both of these options and provide the information required to provide two wells within the City for immediate needs and evaluate the viability of developing a new regional source of water that can be incorporated into planning for other long-term water options available for the region.

To respond to your request, Collier Consulting (Collier) is pleased to provide you with this proposal to conduct well site exploration activities for the City. Collier will partner with our teaming partner Spheros Environmental (Spheros) to provide data management, data visualization, and technical support for the project. Spheros (formerly LRE) has recently hired a midlevel hydrogeologist in Milwaukee who will be supporting this project.

Background

Previous exploration studies conducted for the City identified several areas with potential for sand and gravel and dolomite wells, collectively known as the shallow aquifer, as well as developed deep sandstone aquifer wells in the Deep Sandstone Aquifer. I have

personally conducted several well siting projects for the City over the last 30 years that have led to the development of several dolomite aquifer wells and paired well installations of sandstone and dolomite wells on the same site or on adjacent sites.

A notable study is a regional reconnaissance study of groundwater resources in the City I completed in 1995 for Ted Zoricha and Associates (TZA, 1995). Much of the basic information of the hydrogeology of the area was compiled for that study. There are new data sets that should be incorporated into the maps developed for the 1995 report to improve the understanding of the subsurface and identify the most favorable well sites on the available land. This study proposes to update the information produced by that study to identify the potential to develop additional shallow aquifer wells as well as new methods to select sandstone well locations to avoid subsurface hazards such as PreCambrian mounds that reduce the thickness of the sandstone and reduce the yield of a well or drilling into the Waukesha fault plane that has caused the collapse of two wells in the City.

Figure 1 is a recent bedrock elevation map for Waukesha County that illustrates the location of a major bedrock valley, the Rock Bedrock Valley, that trends southwest to northeast across the county within a few miles of the City. The Rock Bedrock Valley has been used as an aquifer for many other municipal water systems in the area including Hartland, Oconomowoc, Jackson and Slinger. It represents a regional aquifer with the capacity to supply millions of gallons per day to a properly designed well field. The map also indicates the presence a smaller bedrock valley that enters the City on its west side and trends to the east in the central part of the City. This tributary valley has been used to support a high capacity municipal well for the Village of Pewaukee and may contain similar permeable units capable of supporting additional high capacity wells within the City boundaries.

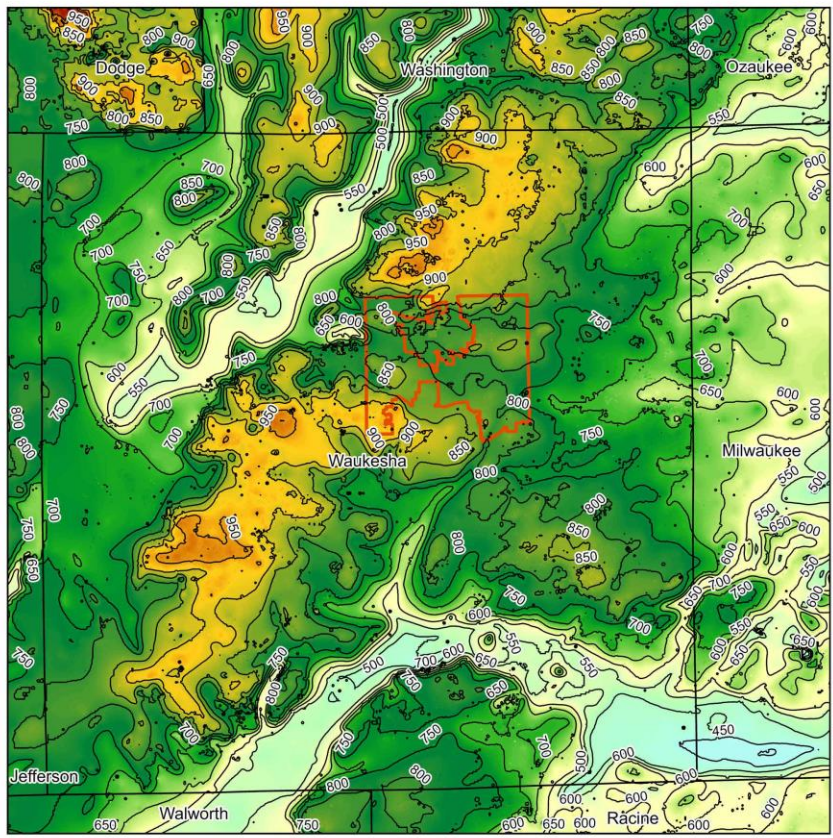
Figure 2 is a map of fracture traces prepared for the 1995 TZA study. It indicates areas interpreted to have underlying fracture zones in the dolomite bedrock that are potentially capable of supporting high capacity municipal wells. The City produces water from 5 wells in the dolomite aquifer that range in capacity from 30 to 521 gpm. Additional high capacity wells can be developed in the dolomite aquifer within the City if suitable well sites can be identified.

Successfully siting a high capacity municipal well in the sand and gravel or dolomite aquifer within the City will require geophysical exploration and test borings on available land in suitable areas within the City. Given the rate of development over the last 20 years, the number of suitable well sites is likely to be limited and efforts to identify and preserve these sites will be important for the current and future water supply needs of the City.

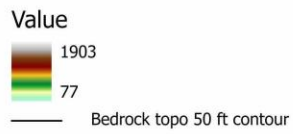
In addition to the shallow aquifer, the City also has the option to develop additional wells in the sandstone aquifer. Sandstone wells are more expensive to drill and pump, but they are less susceptible to contamination from surface sources. They are likely to produce water with elevated radium and are often paired with shallow aquifer wells to blend down

the radium and increase the volume of water that can be pumped from a single well site. The city produces water from 7 sandstone wells that range in depth from 1,000 to 1,415 feet deep with capacities from 130 to 752 gpm. The sandstone aquifer is known to vary in thickness and there are areas with knobs of impermeable quartzite or granite on the surface the basement rock that protrude into the aquifer and reduce the thickness of the sandstone and reduce the capacity of wells in those locations. The sandstone is also split by the Waukesha Fault and at least on City well was drilled into the fault zone and ultimately collapsed.

Siting a successful sandstone well requires selecting a site that is far enough from existing sandstone wells to minimize interference between the wells as well as avoiding mounds on the basement surface or drilling into the Waukesha Fault. **Figure 3** shows the distribution of gravity data in Waukesha County from a UWM MS thesis (Brukardt, 1983). The regional gravity data can be used to identify potential mounds on the basement rock surface as well as identify the location of the Waukesha Fault Zone as shown on **Figure 4**. This can significantly increase the probability of drilling a high yielding sandstone well with a stable borehole. Previous work for the Village of Pewaukee has identified a correlation between the gravity readings and thickness of the sandstone and the specific yield of sandstone wells. Similar analysis will be used to identify favorable sandstone well locations within the City.



Wis_100m_bedrock_topography_feet



From Rehwald and Rawling (2026)

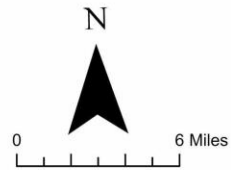


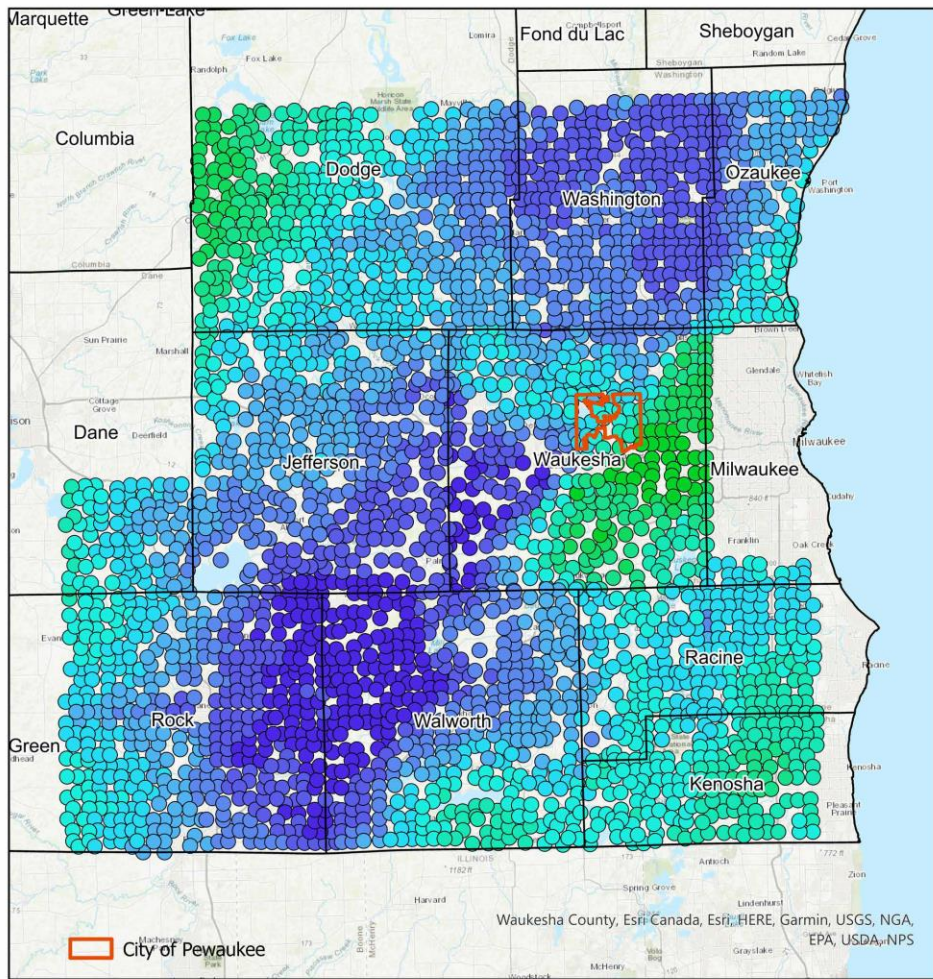
Figure 1: Bedrock topography of Waukesha County



CONTOUR INTERVAL 10 FEET
 NATIONAL GEODETIC DATUM 1983
FRACTURE TRACE MAP
TOWN OF PEWAUKEE, WISCONSIN

• Dolomite Well
 • Sand and Gravel Well
 / Fracture Trace
MAP 4
 Ted Zorlich & Associates, Inc.
 November, 1995

Figure 2 Map of fracture traces in the City of Pewaukee prepared for the 1995 TZA study



Bouguer anomaly (2.67 gm/cc)
Waukesha County

- -49.550000 - ● -40.709999 -
- -47.880000 - ● -39.510000 -
- -47.879999 - ● -39.509999 -
- -46.300000 - ● -37.940000 -
- -46.299999 - ● -37.939999 -
- -44.600000 - ● -36.050000 -
- -44.599999 - ● -36.049999 -
- -42.480000 - ● -33.870000 -
- -42.479999 - ● -33.869999 -
- -40.710000 - ● -31.370000 -

Bouguer anomaly (2.67 gm/cc)
Other Counties

- -49.550000 - ● -40.709999 -
- -47.880000 - ● -39.510000 -
- -47.879999 - ● -39.509999 -
- -46.300000 - ● -37.940000 -
- -46.299999 - ● -37.939999 -
- -44.600000 - ● -36.050000 -
- -44.599999 - ● -36.049999 -
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- -42.479999 - ● -33.869999 -
- -40.710000 - ● -31.370000 -

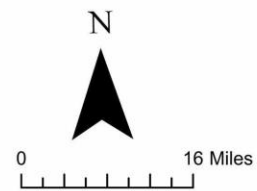


Figure 3 Gravity data in Waukesha County from Brukardt, 1983.

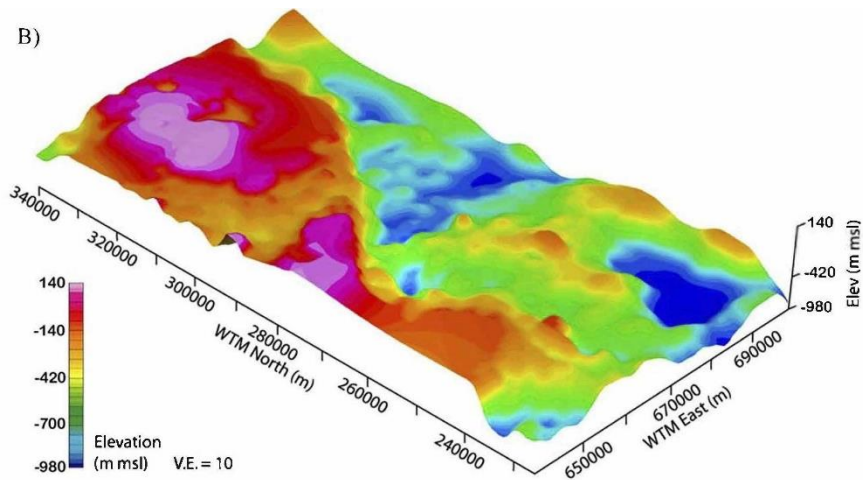


Figure 4: Modeled Elevation of Basement Surface from Gravity Data in Southeastern Wisconsin (Skalbeck 2008)

Project Work Plan

For the sake of efficiency and clarity, this project has been divided into two distinct tracts. **Phase 1** will focus on identifying two well sites for municipal wells to meet your immediate needs. **Phase 2** will be a feasibility study to evaluate the potential to develop a regional well field in the Rock Bedrock Valley just west of the City limits. Development of this aquifer will require cooperation between the City and other municipal entities but will provide a source of water with enough capacity to service several municipalities and provide an economy of scale to diffuse the impact of the capital costs and any current or future treatment requirements. This option should be considered as a potential long term source of water and as a alternative or back up to other regional options such as the expansion of Lake Michigan water.

Phase 1: Site Two Municipal Wells within the City Limits

Phase 1: Task 1 Geologic Reconnaissance Work Plan

The work will focus on updating the 1995 Reconnaissance report and maps to identify viable options for well sites in the shallow or deep sandstone aquifer. The preference will be to identify potential shallow aquifer wells that could be paired with sandstone aquifer wells on the same well site. **Phase 1** will also use regional gravity data to identify favorable areas for sandstone aquifer wells. The gravity data will be used to determine favorable locations for sandstone aquifer wells to minimize the risk of hitting shallow PreCambrian basement rock that thins the available sandstone and causes reduced well capacity, such as was encountered at Village of Pewaukee Well 5, find areas of the sandstone likely to have greater thickness and higher specific capacity for wells, and map the location of the Waukesha Fault trace to avoid hitting large fracture zones and incompetent rock such as was encountered in City of Pewaukee Well 5.

The City will be asked to provide a map of parcels that are available, or potentially available to the City. New well data in the area will be used to update the depth to bedrock map and bedrock elevation map. The Fracture Trace analysis map will be updated around sites identified as being potentially available to the City.

The potentially available parcels identified by the City will be overlaid on the maps to identify candidate exploration areas for dolomite or sand and gravel wells. A geophysical exploration program will be designed based on the size, number and site conditions and number of exploration sites. The exploration efforts will depend upon the specific target and site conditions and are expected to consist of some combination of electrical resistivity tomography (ERT), time domain electromagnetic conduction (TEM) and/or seismic refraction tomography (SRT). The scope and cost of the geophysical exploration program cannot be determined until the number of sites and areas to be studied has been identified. Based on similar exploration efforts, the geophysical exploration for shallow wells can be expected to be cost between \$30,000 and \$50,000. The results will be summarized in a report with updated maps.

If the shallow well exploration identifies promising sites, test borings and test wells will be required to confirm the capacity and quality of water available. The report for the shallow well geophysical exploration work will include the location and construction details for test borings to confirm the results and identify locations for test wells and production wells. The number and costs of the test borings cannot be determined until the geophysical work is completed, but based on previous studies in the area it can be expected to cost between \$50,000 and \$100,000, including drilling and oversight costs depending on the number and depths of the borings. This estimate will be revised as site information becomes available.

Task 1 will also include an analysis of existing data to select promising sandstone well locations. The regional gravity data and well logs will be used to produce a map of favorable sandstone well site. Sandstone well locations will be found on or near potential shallow aquifer well sites if possible. If no favorable shallow well sites are identified, the regional data will be used to find the most favorable sandstone well sites on potentially available land that is favorably positioned to existing watermains and infrastructure. An area of particular interest is the southern portion of the City near the border with the City of Waukesha. The conversion of the City of Waukesha from groundwater to surface water has caused a recovery of 100 to 200 feet in water levels in the sandstone aquifer and has made areas in the southern part of the City of Pewaukee much more favorable for sandstone well development. We will use the available data to identify potential sandstone well locations with an emphasis of collocating shallow wells with sandstone wells, if possible. Sites will be chosen to reduce potential interference with existing or potential future sandstone wells and maximize the expected thickness of the sandstone and capacity of the wells.

The estimated cost of Phase 1, Task 1 is \$20,000 not to exceed, to be billed at our standard rates. The estimated costs of the subsequent geophysical exploration and test drilling have been provided in the text above but are subject to change based on the specific drilling targets, number and depth of borings, and the driller selected.

Phase 2: Evaluate the Feasibility of Developing a Regional Well Field in the Rock Bedrock Valley

Phase 2 will be a high level feasibility study of the options to develop a regional well field in a Rock Bedrock Valley Aquifer west of the City. Regional geologic maps of the depth to bedrock, bedrock elevation, and regional gravity data will be used to delineate the limits of the Rock bedrock valley (**Figure 1**) west of the City. Areas of open land or potentially available land will be identified on the map as possible well field areas. Well logs from existing wells will be used to construct geologic cross sections crossing the bedrock valley in locations that appear favorable for well field development. The geologic cross sections will be used to identify areas with permeable sand and gravel deposits that are covered by low permeability confining units.

Phase 2, Task 1: High Level Evaluation of the Feasibility of Developing a Regional Well field

This task will include a review of available regional geologic reports to map the shape of the Rock Bedrock Valley adjacent to the City. This review will include published geologic maps, a review of the regional gravity data, and the construction of approximately three geologic cross-sections to illustrate the hydrostatigraphy of the aquifer system in the bedrock valley. The cross sections will delineate the layers of permeable sand and gravel aquifer material and the low permeability confining units above and below the aquifer units that separate the aquifer. The confining units will provide isolation between the pumping wells and shallower domestic wells and surface water resources and reduce the risk of contamination from surface sources.

The project will start with a meeting with the City and their invited guests to establish the vision for the project and identify the areas to focus on in terms of areas to explore, and discuss potential impacts to shallow aquifers and surface water to evaluate and potential partners to consider. The results will be presented in a concise high level report, that identifies the potential well locations, potential well yield and water quality, parcels of potentially available land that could be suitable for well field development, and a discussion of the advantages and disadvantages of a regional well field. The report will also include a discussion of the steps that would be required to develop the well field. Strategies to acquire and preserve the land would also be discussed, such as locating the well field on existing or future public lands such as parks or sports complexes, or identifying specific well sites within land planned for development to set aside the future well sites and allow development of the site for other uses.

It should be noted that **Task 2** should be completed soon before more potential sites are lost to development and to allow enough time for discussions with regional partners to evaluate the implications and advantages of the formation of a regional groundwater utility to complement the existing surface water utility in the County. The new groundwater utility could be used to supply areas of Waukesha County where a regional surface water utility may not be possible or practical. The groundwater source can also be used as a backup to serve the surface water service area if there is ever an interruption of the surface water source or changes in economic or political conditions

We anticipate there will be a need for on-going technical support to the City if this option is pursued. Collier and Spheros will be available as needed to provide analysis, recommendations, and support in negotiation with other municipalities or regulatory agencies as needed on an ongoing basis at our normal billing rates with the scope of each effort to be defined In a concise scope of work and approved by the city.

The estimated cost of Phase 2, Task 1 is \$15,000 not to exceed, to be billed at our standard rates. The estimated costs of the subsequent support services will be billed at our standard rates based on scopes of work approved by the City.

Closure

Collier and Spheros appreciate the opportunity provide this proposal. We are prepared to start working within 2 weeks of notice to proceed and we anticipate requiring approximately 30 days to complete Phase 1 and an additional4 to 6 weeks to complete Phase 2, assuming that both phases are approved. Approved. We will require input from the city as to the availability of land for Phase1 and the areas of potential interest for the regional well field in Phase 2, potential future partners to be considered, and the availability of land, and the preferred water transportation corridors.

We trust this information meets your needs and look forward to working with you and the City to locate new municipal well sites and evaluate regional water supply options. If this is acceptable, please sign and return the attached professional services agreement. Please let us know if we can answer any questions or provide more information.

Sincerely,



John Jansen, P.G., Ph.D.
Principal Hydrogeologist
Collier Consulting, Inc.
john@collierconsulting.com

Geophysical Project Cost Estimate



COLLIER
GEOPHYSICS

7711 W. 6th Ave., Suite G
Lakewood, CO 80214
Office: 720.487.9200
www.colliergeophysics.com
SDVOSB

Project Name:	City of Pewaukee Well Siting
Proposal Number:	3085
Prepared By:	John Jansen
Proposal Date:	3/20/2026
Estimate Type:	Time and Materials Cost Estimate
Completed For:	Rob Kincaid
Client Phone Number	kincaid@pewaukee.wi.us
Via Email	(262)691-0804
Client:	City of Pewaukee
Project Location:	City of Pewaukee, WI
Project Description:	Data review to site well

PRICING		
Line Item	Estimated Cost	Comment
Task 1. City Well Reconnaissance Study	\$ 20,000.00	
Task 2. Regional Wellfield Analysis	\$ 17,500.00	
Additional Support	TBD	
Total:	\$ 37,500.00	Field work and additional support TBD

Scope of Work:

Collier and Spheros propose to conduct a Task 1 well siting study for the City of Pewaukee to site two municipal wells within the City boundaries and evaluate the feasibility of developing a regional well field outside the City limits. The Task 1 study consists of a study to site one to two new municipal wells within the City limits to meet projected water needs. The City wishes to explore the feasible options to drill new wells in the sand and gravel, dolomite, or sandstone aquifers on sites potentially available to the City. Ideally a single site can be identified that can support both a shallow sand and gravel or dolomite well and a deep sandstone aquifer well. Individual well sites will be needed if a single dual aquifer site can not be identified. The City wishes to avoid sandstone aquifer well sites that lie above mounds of PreCambrian rock that will reduce the yield of a sandstone well and also avoid sites above the Waukesha Fault that can result in unstable boreholes in sandstone wells. The Collier team proposes to collect and reinterpret existing geologic reports and geophysical data collected for previous studies, including gravity data collected by the USGS and UWM, to map the Waukesha Fault and identify favorable and available sites for shallow wells and/or deep sandstone wells. The results will be used to update a geological reconnaissance study prepared for the City in 1995. Collier will compile this data, review it to identify favorable sites for shallow well exploration or siting a deep sandstone well. The cost estimate includes a budget for site visits and meetings with the Village and their engineers to discuss options and a cornice report describing the results with recommendations for subsequent geophysical exploration. Estimated costs to conduct geophysical exploration and test drilling support for shallow aquifer wells and permitting and drilling support for sandstone wells will be provided as project needs are identified. The Task 2 regional well field evaluation project will consist of a review of regional geologic reports and geophysical data to identify potential well field sites and support the City with design and negotiations to evaluate the potential role of a groundwater wells field as part of a long term water supply for the region. The deliverable of the project will be a report describing the methods used and the relevant findings. Collier and Spheros will be available as needed to support negotiations and planning for the development of a regional water utility or wellfield.

Key Assumptions and Limitations - (Quote valid for 90 days)

- The detail of the analysis is limited to the detail of available information and any additional data collection authorized by the Village.
- Access provided to the site by the client - cost for permitting is not included
- Work area needs to be safe and navigable for staff and equipment.
- Field work cannot be completed during inclement weather; crew and equipment safety will affect where lines are placed
- Actual field parameters may be altered on-site by the field geophysicist to optimize the investigation

Notice to Proceed

This notice to proceed authorizes Collier Geophysics, LLC. to complete the scope of work at the estimated cost presented above and must be completed and signed prior to the start and performance of any work. Upon signing, Client agrees to the General Terms and Conditions of Collier Geophysics.

Client: _____ City of Pewaukee

Authorized by: _____
(Name and Title)

Signature: _____

Date: _____

COLLIER GEOPHYSICS' (COLLIER) GENERAL TERMS AND CONDITIONS

FEE PAYMENT

- 1) COLLIER will submit invoices to Client monthly following any month of significant activity or at key project milestones, and a final invoice upon completion of services. Invoices will show charges based on current COLLIER Fee Schedules or other agreed-upon basis, and will include a detailed separation of charges and supporting information.
- 2) Payment is due upon receipt of invoice. On accounts past due by forty-five (45) days, Client will pay a finance charge of 1.5 percent per month dating from the invoice date.
- 3) In the event Client requires expert-witness testimony, Client will pay COLLIER all past due balances before COLLIER will proceed to prepare for or offer testimony.
- 4) Client will pay the balance stated on the invoice unless Client notifies COLLIER of the particular item that is alleged to be incorrect within fifteen (15) days from the invoice date. Client will remit the balance of undisputed items in a timely manner while a disputed item is being reviewed.
- 5) In the event Client fails to pay COLLIER within forty-five (45) days following invoice date, COLLIER may consider that a breach of the consulting agreement and all duties of COLLIER may be suspended or terminated, and work product may be withheld, without liability of any kind to COLLIER.

OWNERSHIP OF DOCUMENTS AND CONFIDENTIALITY

- 1) All reports, field data and notes, laboratory test data, calculations, estimates, and other documents prepared in the course of consulting service shall remain the property of COLLIER. Client agrees that all reports and other work COLLIER furnished to Client or Client's agents which are not paid for, will be returned upon demand and will not be used for any purpose whatsoever.
- 2) Documents provided to COLLIER by Client will be returned to Client, upon request, at the completion of work at Client's cost.
- 3) Reuse of reports or other materials by Client or others, on extensions or modifications of the project or on other sites, without written permission from COLLIER or adaptation by COLLIER for the intended purpose, shall be at the user's sole risk, without liability on the part of COLLIER, and Client agrees to indemnify and hold COLLIER harmless from all claims, damages and expenses, including attorney's fees.
- 4) COLLIER shall maintain Client's project data and reports in strictest confidence, and will release such information to others only upon written permission from Client.

DISPUTES

- 1) Client will pay all collection expenses or litigation fees, including attorney fees, that COLLIER incurs in collecting any delinquent amount Client owes.
- 2) If the Client institutes a suit against COLLIER which is dismissed or for which judgment is rendered for COLLIER, Client will pay COLLIER for all costs of defense including attorney fees, expert witness fees and court costs.

INSURANCE AND INDEMNIFICATION

- 1) COLLIER will carry Workers Compensation, General Liability, Automobile Liability, Excess Umbrella-Form Liability and Professional Liability insurance policies in amounts which COLLIER considers adequate. Certificates of insurance will be provided to Client upon request. Within the terms and conditions of the insurance, COLLIER agrees to indemnify Client against loss caused by actions of COLLIER, its employees or its subcontractors. COLLIER will not be responsible for liability beyond the limits and conditions reflected herein and in the Certificate of the Insurance. At Client's request, COLLIER will seek additional insurance coverage or limits for specific projects, and will bill Client for the additional premium cost. COLLIER will require that its field subcontractors are insured to the same levels required of COLLIER by Client.
- 2) COLLIER's professional liability will be limited to the value of the consulting services performed.
- 3) COLLIER will not be responsible for any loss or liability related to negligence of Client others employed by Client, or from negligence by any person for whose conduct we are not legally responsible.
- 4) Neither the Client nor COLLIER, their respective officers, directors, partners, employees, contractors or sub-consultants shall be liable to the other or shall make any claim for any incidental, indirect or consequential damages arising out of or connected in any way to the Project or to this Agreement. This mutual waiver of consequential damages shall include, but is not limited to, loss of use, loss of profit, loss of business, loss of income, loss of reputation and any other consequential damages that either party may have incurred from any cause of action including negligence, strict liability, breach of contract and breach of strict or implied warranty. Both the Client and COLLIER shall require similar waivers of consequential damages protecting all the entities or persons named herein in all contracts and subcontracts with others involved in this project.

CUSTODY OF MATERIALS

- 1) In the course of work, COLLIER may take custody of and transport soil and/or water samples from Client's site. Upon the completion of evaluation and/or testing of such samples, COLLIER reserves the right to return the samples to Client at Client's expense, and Client agrees to accept such samples and the responsibility for their proper and legal disposal.
- 2) At no time, under any circumstances, will COLLIER personnel represent COLLIER or themselves as generators of waste, hazardous or otherwise, which may have to be removed from or disposed of on a site, and COLLIER personnel will not sign hazardous waste manifests on behalf of Client.

SUBCONTRACTORS

- 1) On occasion, COLLIER engages the specialized services of individual consultants or other companies to participate in a project. When considered necessary, these firms or other consultants will be used with Client's approval. The cost of such services plus a fifteen (15) percent service charge will be included in our invoice.
- 2) Alternatively, at Client's request, COLLIER will recommend contractor(s) or specialist(s) for Client to enter into direct contract(s) with. Invoices for outside services will be issued to Client for direct payment to the contractor(s). COLLIER review and approval of each invoice will be provided on request. Under either alternative, COLLIER does not guarantee and is not responsible for the performance of the contractor(s) or the accuracy of their results.

CHANGES TO THE APPROVED SCOPE OF WORK

Once a scope of work is approved and signed, the Client must submit any changes or modifications to the scope of work to COLLIER in writing. COLLIER agrees to provide a response to change orders in a timely manner. Any changes or modifications to the approved scope of work will be at an additional cost, above and beyond the approved scope of work. The additional cost must be agreed upon and a written change order approved by COLLIER and the Client prior to the start of any new tasks.

STANDBY TIME

COLLIER will not conduct on-site work during inclement weather, extreme temperatures or other atmospheric conditions that jeopardize the health and safety of personnel and/or equipment. In the event that COLLIER incurs standby time due to inclement weather, delays by client and/or other on-site contractors working for the Client, and/or other conditions outside the control of COLLIER, Client agrees to pay 75% of personnel rates, 100% of equipment rates, and 100% of expenses.

GEOPHYSICAL & GEOLOGICAL INSTRUMENTATION SERVICES

COLLIER is equipped to provide specialized geophysical and geological instrumentation services according to project needs. Fees for these equipment services will be based on use charges at standard rates published by COLLIER plus fees for consulting services. Client agrees to be responsible for any equipment stuck downhole and the recovery thereof.

RIGHT OF ENTRY

Client will furnish right-of-entry on the site for COLLIER to conduct the work. COLLIER will take reasonable precautions to minimize damage to the land from use of its equipment but has not included in the fee the cost for restoration of damage that may result from site operations. If COLLIER is required to restore the land to its former condition, this will be arranged and the cost plus fifteen (15) percent will be added to our fee.

DAMAGE TO SUBSURFACE STRUCTURES

Reasonable care will be exercised in locating subsurface structures in the vicinity of proposed subsurface explorations. This will include contact with the local agency coordinating subsurface utility information (i.e., "Call Before You Dig" service) and a review of plans provided by Client for the project site. COLLIER shall rely upon any information provided by Client or Client's agent or representative. If the locations of underground structures are not known accurately or cannot be confirmed, then there will be a degree of risk to Client associated with conducting the work. In the absence of confirmed underground structure locations, Client agrees to accept the risk of damage and possible costs associated with repair and restoration of damage resulting from the work.

PETROLEUM PRODUCTS AND HAZARDOUS MATERIALS

If, at any time, evidence of the existence or possible existence of hazardous materials is discovered, COLLIER reserves the right to renegotiate any consulting agreement, the fees for our services and our continued involvement in the project. COLLIER will notify Client as soon as possible should unanticipated hazardous materials or suspected hazardous materials be discovered. Client agrees to compensate COLLIER for the cost of any and all measures that, in our professional onsite judgment are justified to protect the health and safety of our personnel, Client's employees, the public, and/or the environment. In addition, Client waives any claims against COLLIER and, to the full extent permitted by law, agrees to indemnify, defend and hold COLLIER harmless from any and all claims, damages and liability, including but not limited to cost of defense, in any way connected with the hazardous materials.

Conflicting Terms

These general terms and conditions shall govern and control, unless specifically provided to the contrary in any attached proposal or supplemental agreement. The fact that additional terms or provisions appear in one or the other document shall not, in and of itself, create a conflict.

STANDARD OF CARE

In accepting our proposal for consulting services, Client acknowledges the inherent risks associated with any geological investigation. In performing professional services, COLLIER will use the degree of care and skill ordinarily exercised under similar circumstances by members of the profession practicing in the same or similar localities. COLLIER makes no express or implied warranty beyond our commitment to conform to this high standard of professional practice.



April 10, 2026

Mr. Rob Kincaid
Assistant Utility Manager
City of Pewaukee Water and Sewer Utility

RE: Proposal For Municipal Well Siting Study, City of Pewaukee, Wisconsin

Dear Mr. Kincaid,

INTERA has prepared this proposal to conduct a municipal well siting study and long-term water supply planning study for the City (the City) of Pewaukee, Wisconsin. As we understand, the City desires to add locate and develop municipal well site(s) with a minimum capacity of 500 gallons per minute (gpm) in either the shallow unconsolidated sand and gravel, fractured Silurian Niagaran Dolomite or Cambrian Deep Sandstone aquifers. The City desires that the proposed study be used for short or near-term planning to identify and develop high-capacity municipal well sites prior to land use restraints due to rapid residential and commercial development in the greater Pewaukee area. In addition, the proposed study will also be used for long-term water supply planning to help the City determine if obtaining water supply from Lake Michigan is the best option for future water supply.

Background Information

The City operates twelve municipal wells that are constructed in the unconsolidated sand and gravel, Silurian Niagaran and Cambrian deep sandstone aquifers (Figure 1). Two of the City's deep sandstone wells have had issues with collapsed formation which may be related to the Waukesha Fault and high radionuclide concentrations are also present in some of the sandstone wells. Elevated PFAS and chloride concentrations are also present in some of the City's shallow wells. In addition, the City has been experiencing rapid residential and commercial development which can make it challenging to locate and develop high capacity shallow sand and gravel wells.

In 1995, a Task 1 geologic reconnaissance study (TZA, 1995), was conducted in the Pewaukee area to identify potential high capacity sand and gravel and fractured dolomite well exploration areas. Potential sand and gravel well exploration areas were focused on land parcels that overlapped a buried, bedrock valley system, whereas fractured dolomite well exploration areas were selected based on the results of an aerial photo-lineament/fracture trace analysis. Many of the delineated exploration areas are likely no longer available due to unfavorable land use or close proximity to potential contaminant sources. Therefore, INTERA recommends that an updated Task 1 well siting study be conducted incorporating new data sources (i.e. well construction reports, regional hydrogeologic studies, LIDAR data) to identify potential high capacity well sites. The recommended study area will cover the City of Pewaukee boundary and adjacent areas (approximately 2-3 miles beyond City boundary).

Based on our extensive high-capacity well siting experience, the objectives of our proposed Task 1 study will be:

- Further delineation of the regional scale pre-glacial buried bedrock valley and tributary system in Pewaukee and surrounding areas. The results of this analysis will be used to delineate potential high-capacity sand and gravel test well locations with specific recommendations designed to further assess aquifer capacity and water quality.
- Conduct an updated photo-lineament analysis utilizing historical and current aerial photographs to identify potential areas associated with bedrock fracture zone(s) and faults in the Silurian Niagaran dolomite bedrock aquifer. The results of this analysis will be used to delineate potential high capacity fractured dolomite test well locations with specific recommendations designed to further assess aquifer capacity and water quality.
- Conduct a detailed analysis of the Precambrian surface utilizing regional studies (Skalbeck, J.D., and Others, 2006 and 2014) which utilized aeromagnetic, gravity and well log data to identify areas with where overlying deep sandstone aquifer has: 1) good potential for favorable water capacity production and aquifer water quality; and sufficiently offset from the Waukesha Fault to avoid issues with collapsed sandstone formation.
- Identify known and potential environmental contaminant sources to help safeguard the potable water supply and to meet all Wisconsin Department of Natural Resources well setback criteria.

INTERA's proposed hydrogeological assessment will be led by Mr. Pat Jurcek, P.G., senior hydrogeologist who has over 34 years of experience conducting numerous municipal and industrial high capacity well siting studies throughout Wisconsin and North America (including the previous 1995 well siting study). Mr. Jurcek is also familiar with the Wisconsin Department of Natural Resources (WDNR) requirements and regulations for developing municipal potable high capacity sand and gravel wells. A copy of Mr. Jurcek's resume is included in the INTERA Midwest Water Supply SOQ (submitted with this proposal). Mr. Jurcek will also utilize other staff and resources at INTERA to complete the proposed study in a timely and efficient manner.

Proposed Task 1 Hydrogeological Assessment Study Methodology

A summary of the proposed scope of work and cost estimate is provided below.

- **Delineation of buried, bedrock valley system:**

In addition to utilizing previous exploration studies results, INTERA will obtain the GIS files associated with the Wisconsin Geologic and Natural History Survey (WGNHS) southeastern Wisconsin bedrock topography map (Evans, T.J., and Others, 2004). Selected domestic and high capacity well construction reports would be then used to further refine the above initial bedrock valley trend and to evaluate potential areas for the presence of permeable sand and gravel deposits capable of sustaining high capacity well(s). Starting with a regional bedrock topography map (to incorporate bedrock valley and tributary trends beyond City limits) and then adding updated subsurface data has been utilized by INTERA to produce a higher resolution map of the bedrock topographic surface in other well siting studies conducted in southeastern Wisconsin (see Figure 2).

- **Photo-lineament analysis:**

INTERA will obtain historical and current aerial photographs of the Pewaukee area along with Light Detection and Ranging (LIDAR) maps to identify potential subsurface bedrock fracture and

fault zones. Subsurface bedrock fracture zones and associated weathering features often result in surface topographic depressions and concentrated water seepage features which can be delineated. Initially, INTERA will utilize the previous photo-lineament analysis results and utilize the higher resolution aerial photographs and LIDAR maps to provide an updated assessment of potential bedrock fracture zone areas.

▪ **Evaluation of Cambrian Deep Sandstone Potential Well Sites:**

In addition to further delineating the trend of the Waukesha Fault in the study area, INTERA will utilize regional studies (Skalbeck, J.D., and others, 2006 and 2014) which utilized aerial aeromagnetic and gravity data to infer the underlying Precambrian granite surface. From experience deep sandstone well yields and water quality (i.e. high radionuclide, TDS and chloride concentrations) often correlates with the presence of ridges and depressions on the underlying Precambrian surface. Data from the above studies will be used to generate a detailed map of the inferred Precambrian surface in the study area which will also include sandstone well log data and water quality to identify potential deep sandstone wells that are sufficiently offset from the Waukesha Fault, and Precambrian ridges and depressions. Figure 3 summarizes the inferred Precambrian surface in southeastern Wisconsin (Skalbeck J.D., and Others, 2006 and 2014) which illustrates the trend of the Waukesha Fault and the highly variable Precambrian surface.

▪ **Inventory of Potential Contaminant Sources:**

Initially, INTERA will review the 2025 potential contaminant source inventory conducted by Strand Associates for the City. State and federal databases will be accessed to obtain updated information on known environmental contaminant sources in the study area. The objective will be to locate all known potential contaminant sources within the study area to minimize the potential of groundwater contamination and to determine all WDNR contaminant well setback distances at potential designated well site(s).

Maps and data compiled from above will be summarized in a brief technical report that will also provide a map with recommended specific, designated areas that the City can utilize to try and obtain exploration easements to develop high capacity well site(s). After potential well exploration site(s) have been secured, a program can be designed to proceed with site specific testing to further evaluate aquifer water production capacity and water quality.

Project Cost Estimate

The proposed scope of work will be conducted as lump sum with the costs listed for phase of the proposed project.

Project Cost Estimate, Municipal Well Siting Study, City of Pewaukee, Wisconsin	
Project Phase	Cost
1. Data Collection	\$3,580
2. Photo-lineament Analysis	\$5,560
3. Delineation of buried, bedrock valley system	\$5,975
4. Evaluation of Cambrian Deep Sandstone Potential Well Sites	\$5,530
5. Inventory of Potential Contaminant Sources	\$5,770
6. Report Preparation	\$14,950
Final Project Cost Estimate	
\$41,365	

INTERA appreciates the opportunity to submit this proposal to conduct this very important water supply study for the City of Pewaukee, Wisconsin. Please contact INTERA if you have any questions or need additional information,

Sincerely,

INTERA Incorporated



Patrick J. Jurcek, P.G.
Senior Hydrogeologist

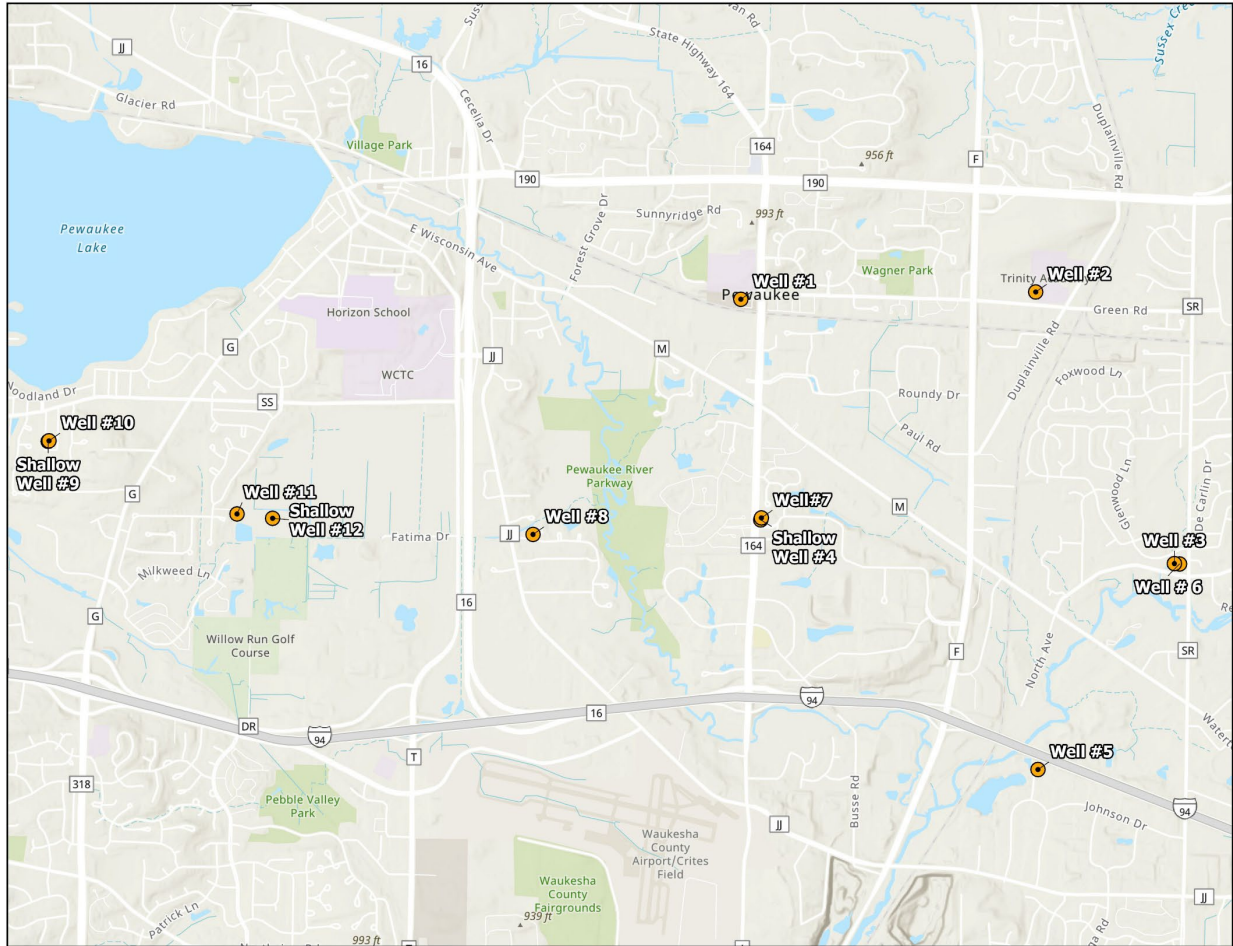


Figure 1: Municipal Well Location Map, City of Pewaukee, Wisconsin

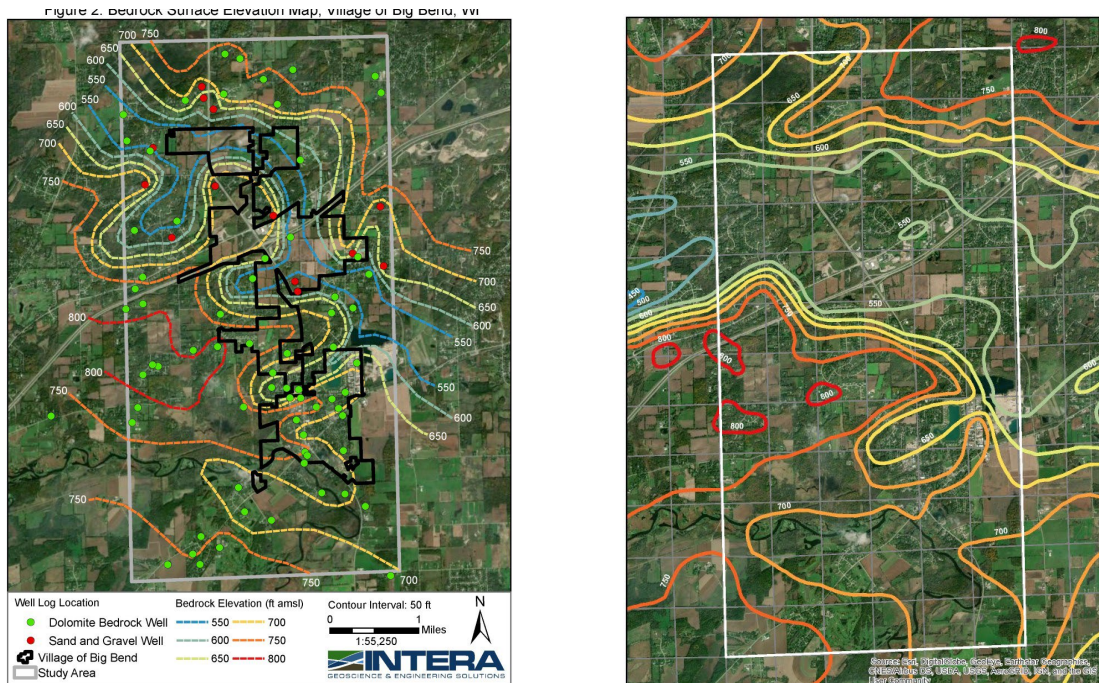


Figure 2: Regional Bedrock Surface Topography (right) and Detailed Bedrock Surface Topography (left), Big Bend, Wisconsin

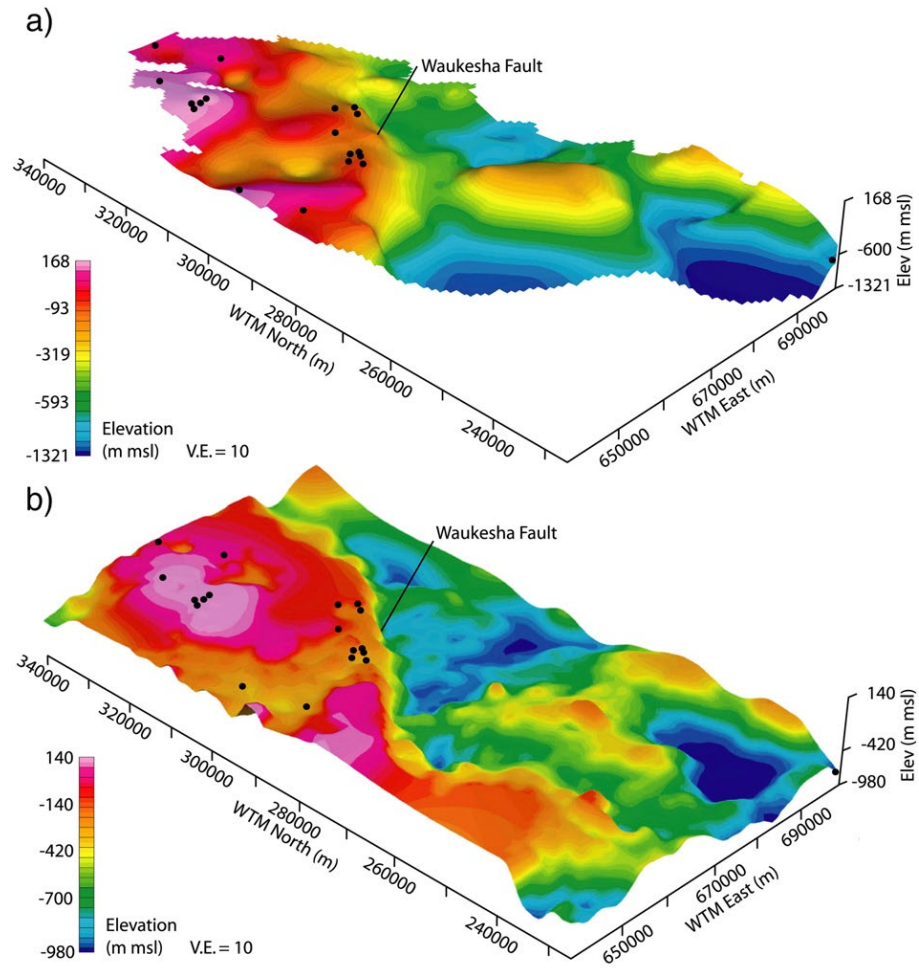


Figure 3: Comparison of Precambrian Basement Topography, SE Wisconsin based on 2-3 and 4-D profile models and well logs (A) and Based on 3-D model and Well log Data (B)

REFERENCES

- Evans T.J., Massie-Ferch, K.,M., and Peters, R., M., 2004: Preliminary Bedrock Topography Map of Walworth, Racine, Kenosha, Milwaukee, Waukesha, Ozaukee and Washington Counties, Wisconsin Geological and Natural History Survey (WGNHS) Open-File Report 2004-19
- Skalbeck, J.D., Couch, J.N., Helgesen, R.S., and Swosinski, D.S., 2006: Coupled Modeling of Gravity and Aeromagnetic Data to Estimate Subsurface Basement Topography in Southeastern Wisconsin, Geoscience Wisconsin, Volume 17, WGNHS, pp 53-64
- Skalbeck, J.D., Koski, A.J., and Peterson, M., T., 2014: Estimation of Precambrian Basement Topography in Central and Southeastern Wisconsin from 3-D Modeling of Gravity and Aeromagnetic Data, Journal of Applied Geophysics No. 106, Elsevier, p 187-195
- Ted Zorich and Associates (TZA), 1995: Report on Task 1.0 Geologic Reconnaissance Investigation for Municipal Well Siting Study, report submitted to Sanitary District No.3, Town of Pewaukee, Wisconsin

City of Pewaukee - New Agenda Item

Agenda Language:

Discussion regarding an Excerpt-AWWA Beyond the Replacement Era: Balancing Compounding Infrastructure Needs With Household Affordability

Sub Item Agenda Language:

Background Provided By:

Jane Mueller

Background:

This is an excerpt of a report gathered from AWWA. This recognizes the struggle that Utilities across the country are struggling with aging infrastructure, regulatory compliance and affordability.

If you would like a copy of the full report you can contact me.

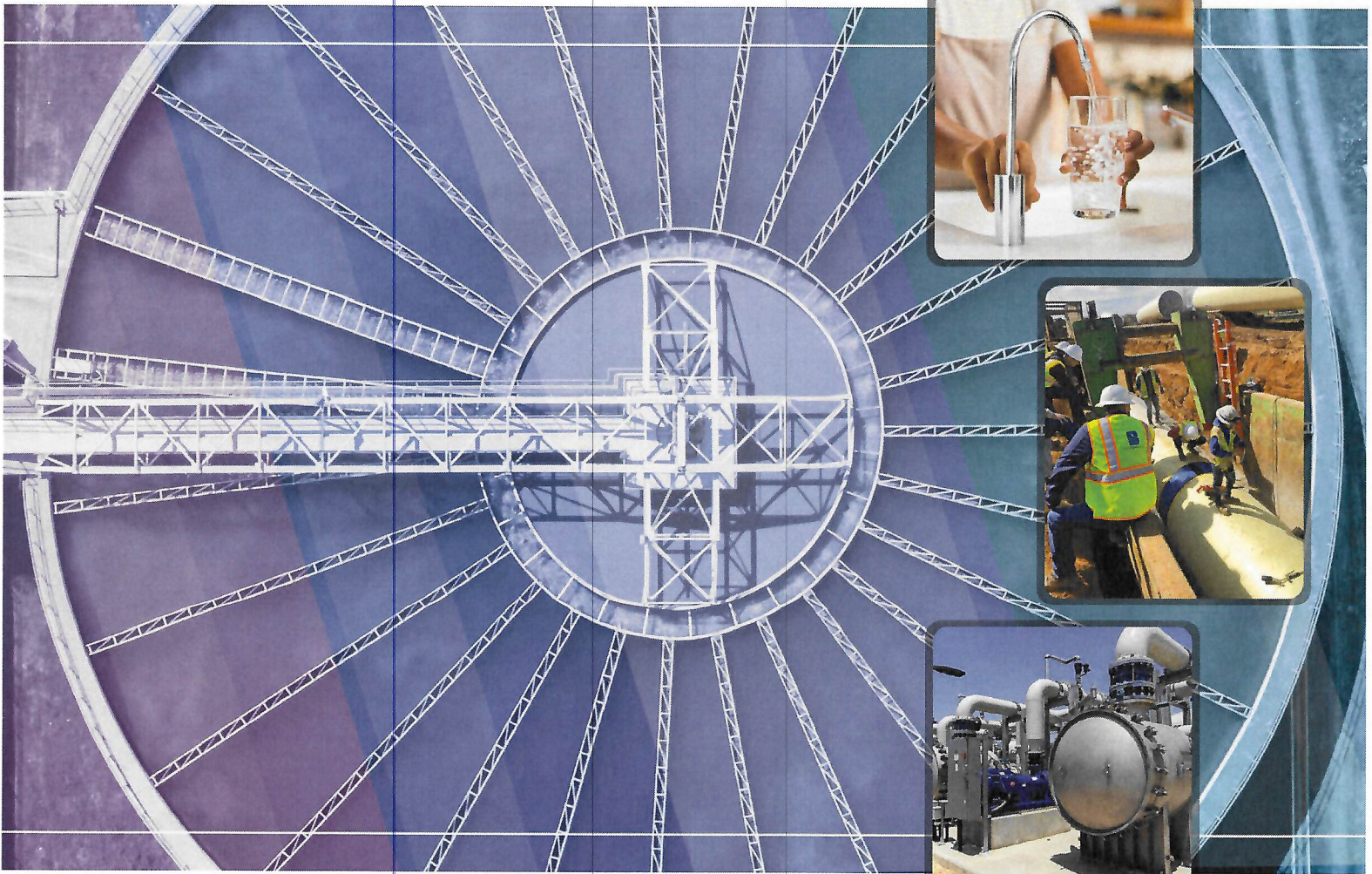
Fiscal Impact:

Recommended Motion:

No action required. This is for informational purposes only.

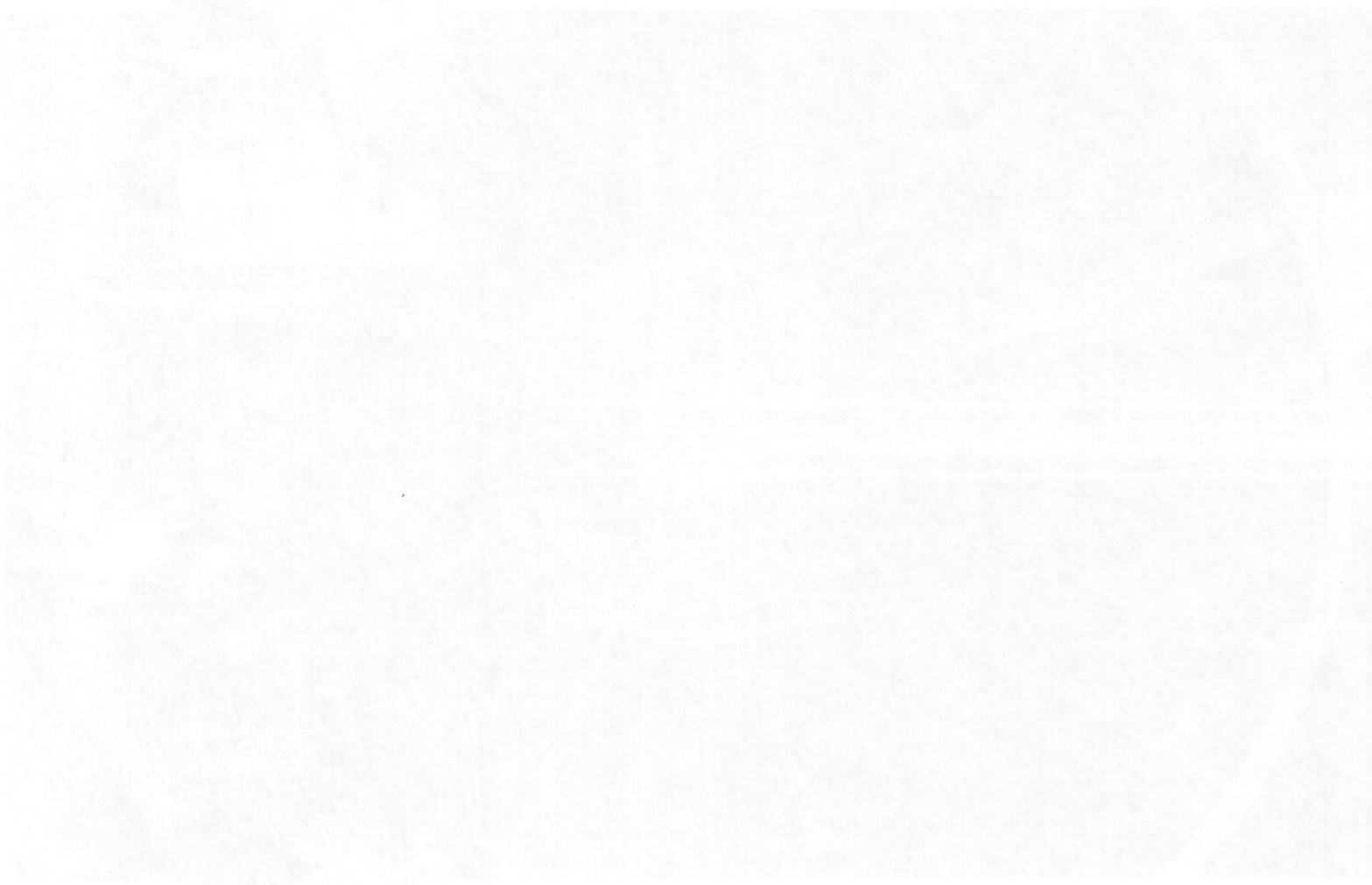
Beyond the Replacement Era:

Balancing Compounding Infrastructure Needs
With Household Affordability



Beyond the Replacement Era:

Balancing Compounding Infrastructure Needs
With Household Affordability



FOREWORD

Beyond the Replacement Era

Strong, reliable drinking water infrastructure underpins the health and economic vitality of our communities—but the cost of sustaining it is rising rapidly and straining household affordability. Over the past quarter-century, the American Water Works Association (AWWA) has actively raised the conversation about buried water infrastructure above ground, defining the challenge, informing policymakers, and advancing solutions to assist communities and address affordability. Still, respondents to AWWA's 2026 State of the Water Industry survey name water infrastructure renewal and replacement as the top concern in the sector – as they do most every year -- followed closely behind by how to finance those improvements.

This new report verifies their deep-seated concerns. *Beyond the Replacement Era* provides an unprecedented assessment of the headwinds facing communities as they seek to provide robust, sustainable water services through the year 2050.

Key Takeaways from *Beyond the Replacement Era* include:

1. The Water Sector Has Entered a New Cost Era

Drinking water utilities are no longer facing just an asset-replacement challenge; they are confronting a compounding set of cost drivers that include regulatory compliance, climate resilience, cybersecurity, and treating more complex sources. Over the next 25 years (2026–2050), total drinking water infrastructure needs are projected at \$2.1–\$2.4 trillion (2025 dollars), far exceeding earlier estimates tied solely to buried infrastructure. These pressures signal a structural shift in the cost of providing safe drinking water, not a temporary spike.

2. There Is a Persistent and Growing Funding Gap

Current capital spending by drinking water utilities averages about \$33.6 billion per year, while the annual investment needed to meet projected requirements is approximately \$90.2 billion. This leaves an annual funding gap of roughly \$56.6 billion, requiring a 168% increase in capital investment to close it. With a few exceptions (such as the Infrastructure Investment & Jobs Act (IIJA)), federal contributions have been limited — about 3.9% of total public infrastructure sector spending is on all water sector utilities, far below levels provided to other infrastructure sectors.

3. Household Drinking Water Bills Are Likely to More Than Double

If communities rely exclusively on revenue from water bills to close the funding gap, average annual household drinking water bills would rise from \$429 in 2025 to \$969 by 2050 (2025 dollars) — more than doubling in real terms. Even under a baseline spending scenario, bills are projected to increase to \$685, reflecting rising operating and maintenance costs.

4. Affordability is at a Tipping Point

If the funding gap is addressed entirely through increases in household water rates, an estimated 30.4 million households (21.5%) would spend more than 2.5% of their income on drinking water, and 53.5 million households (37.8%) would exceed a 1.5% income threshold. The report estimates that \$13.6 billion per year in assistance by 2050 would be needed to keep water bills below commonly cited affordability benchmarks. These impacts would disproportionately affect low-income households and small-system communities.

5. Core Federal Infrastructure Loan Programs are Critical

The IIJA provided a historic and much needed infusion of funding that expires after FY2026. However, it cannot fully solve the long-term gap. With total annual capital and O&M needs projected to reach \$200.3 billion by 2050, temporary programs will not fully stabilize the sector. Core funding programs like the State Revolving Loan Funds (SRF) and the Water Infrastructure Finance and Innovation Act (WIFIA) remain critical, helping water utilities access low-cost loans with extended repayment periods and customizable terms. Reductions in financing costs can moderate rate increases and help keep water affordable.

AWWA's Infrastructure and Affordability Work in the 21st Century

Beyond the Replacement Era extends a series of AWWA reports that have characterized the U.S. water infrastructure challenge over the past 25 years. *Dawn of the Replacement Era* in 2001 introduced the reality that buried infrastructure, primarily the millions of miles of water mains across the United States, was entering a time where increased investment would be critical. Many of the findings from that report ring true today:

- Pipes are expensive, but invisible
- Pipes are hearty, but ultimately mortal
- Increased expenditure is needed to climb the ramp and avoid a gap
- Addressing affordability is at the heart of the challenge

In 2006, AWWA published *Water Infrastructure at a Turning Point*, which encouraged utilities to adopt asset management strategies to drive the systematic renewal of our water infrastructure. Using the metaphor of a well-maintained car to explain the need for proactive investment, the guide explained that utilities face a choice — the turning point—to either to adopt strategies that will lead to the systematic renewal of our water infrastructure or accept the erosion over time of reliable water service, public health, and environmental quality.

Buried No Longer: Confronting America's Water Infrastructure Challenge (2012) explored the drinking water infrastructure challenge in unprecedented depth, revealing the timing of water main installation and life expectancy, materials used, replacement costs and shifting demographics. It found investment needs for buried drinking water infrastructure alone would total more than \$1 trillion nationwide over the 25 years (between 2011 and 2035). It determined needs would exceed \$1.7 trillion through 2050, split roughly between replacement and expansion. The report noted the cost of these investments would be borne mostly by consumers through higher water rates.

Concurrently, AWWA advocated for a new federal loan program, culminating in 2014 with the passage of WIFIA. WIFIA has since served as an important complement to the critical SRF loans, which help water systems reduce the cost of infrastructure projects and moderate rate increases for consumers.

The Ides of Affordability

Throughout the infrastructure conversation, affordability concerns have steadily risen. In 2004, AWWA published the first of three editions of *Thinking Outside the Bill*, elevating the fact that water and wastewater rates in many communities were rising faster than inflation and low-income wages, leading households to spend an increasing percentage of their income on water and wastewater bills. The third edition (2022) provided new metrics for assessing affordability and an actionable guide to walk utility leaders through diagnosing the problem and identifying solutions.

As affordability concerns swelled, AWWA advocated for increased federal support through the Low-Income Water Assistance Program (LIHWAP). At the same time, it partnered with the National Association of Clean Water Agencies (NACWA) and the Water Environment Federation (WEF) on *Developing a Water and Wastewater Utility Assistance Program* to help utilities design comprehensive assistance programs for households struggling to meet essential needs.

Recognizing the potential for a significant affordability challenge related to federal regulations, AWWA organized an expert panel that created a report in 2021 titled *Improving the Evaluation of Household-Level Affordability in SDWA Rulemaking: New Approaches*. The project aimed to help regulators better understand affordability at a household level. As communities work to replace lead service lines and address PFAS contamination under new regulations, rising water rates will further stress households with lower incomes.

A Water 2050 Challenge

Beyond the Replacement Era for the first time captures the scope of the drinking water infrastructure alongside other critical pressure points impacting affordability. Its reckonings extend to the year 2050, providing a timely challenge for AWWA's Water 2050 visioning initiative. The Water 2050 vision strives for a secure, sustainable, affordable, resilient, and innovative water future.

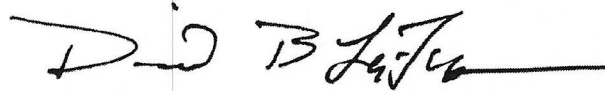
One of the core principles of Water 2050 is that just waiting for change is not a strategy. *Beyond the Replacement Era* lays out the realities confronting our water systems, and it also makes clear that the future is not predetermined. If we move forward collaboratively and with clear intent, we can transform today's realities into a stronger, more resilient water future.

Sincerely,



Heather Collins

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