CITY OF RIVER FALLS WISCONSIN
UTILITY ADVISORY BOARD AGENDA
CITY HALL – COUNCIL CHAMBERS
March 21, 2016

Call Meeting to Order: 6:30 p.m.
Roll Call
Approval of Minutes: February 15, 2016

ACTION MAY BE TAKEN ON ANY OF THE FOLLOWING ITEMS

PUBLIC COMMENTS:

CONSENT AGENDA:

1. Acknowledgement of the following minutes:
   - **a.** West Central Wisconsin Biosolids Facility Commission – 01-19-16
   - **b.** POWERful Choices Committee – 2-11-16

NEW BUSINESS

2. Sediment Assessment Report – Hydro Relicensing

RESOLUTIONS:

3. Resolution Recommending Bid Award for 2016 Sanitary Sewer Lining Project
4. Resolution Recommending Professional Services for North Interceptor Sewer Project

REPORTS:

5. Finance Report
6. Utility Dashboards
   - a. Electric
   - b. Water
   - c. Waste Water Treatment Plant
   - d. Powerful Choices
7. eReliability Tracker 2015 Annual Report
8. Monthly Utility Report

ANNOUNCEMENTS:

ADJOURNMENT:

Post: 03-11-16

REGULAR MEETING
RIVER FALLS UTILITY ADVISORY BOARD
February 15, 2016 6:30 p.m.
Council Chambers, City Hall

The Regular Meeting of the River Falls Utility Advisory Board was called to order by Secretary Beebe at 6:30 p.m. Present: Chris Gagne, Diane Odeen, Wayne Beebe, Tim Thum, and Adam Myszewski. Absent: Grant Hanson, Duane Pederson. Staff present: Kevin Westhuis, Utility Director; Kristi Hartmon, Administrative Assistant; Ron Groth, Water/Waste Water Superintendent and Julie Bergstrom, Finance Director; Other Present: Mark Lundgren, MSA Professional Services; Tom Paque , WPPI Energy

M/S Beebe/Gagne to approve minutes of the January 18, 2016 Regular Meeting. Motion Carried.

CONSENT AGENDA:

1. Acknowledgment of the following minutes:
   West Central Wisconsin Biosolids Facility Commission Meeting – 12-15-15
   POWERful Choices Committee – 1-14-16

M/S Odeen/Myszewski to approve Consent Agenda. Motion Carried.

RESOLUTIONS:

2. Resolution Recommending Bid for Waste Water Treatment Plant Project: Utility Director Kevin Westhuis introduced Mark Lundgren from MSA Professionals as the presenter that will go over the bids that were opened on February 9th for the Waste Water Treatment Facility Reconditioning Project. Mr. Lundgren explained that there were four qualified bidders (Gridor, Staab Construction Corporation, Total Mechanical, Inc. and Miron Construction). MSA was familiar with all four of those contractors and were happy with the bids and they were all acceptable. They each gave a base bid with supplemental bid items and an alternate bid item. The base bid was all the work that the city wanted and supplemental bid items for removal of existing sludge storage ditch and replacement of oxidation ditch valve. The alternate bid item was for extending the construction end date to August 30, 2107.

   MSA and city staff had good discussions on the bids and supplemental and alternate bid items. They decided that it made no sense to go the extra six months of construction because there would be increased engineering fees involved, additional time from city staff and loss of opportunity from energy savings costs associated with this new update. It was also discussed that the price for removing the existing sludge storage ditch was a little out of line. MSA felt this was an opportunity to save some money by doing the removing of the existing sludge storage ditch with internal staff. Supplemental bid item no. 2 was selected consisting of the replacement of an oxidation ditch valve.

The low bidder was Miron Construction. MSA Professionals recommended awarding the construction bid to Miron Construction for $3,751,207. MSA also recommended the creation of a contingency fund of 5% of the construction total which is $187,560. This is to be used for change orders and unforeseen, necessary additions to the scope of work due to project conditions or staff preferences. City staff will approve change orders up to $50,000 and UAB and City Council will approve change orders over $50,000.

The other piece to this project is now that MSA is done with the design piece of this project, MSA proposed a time and materials engineering contract for construction services of $308,872. This covers construction administration, construction staking and construction observation. A time and materials contract will allow the city to change the level of service provided based on onsite conditions. The expenses will be reviewed with city staff on a monthly basis. This proposed engineering fee is for specific tasks necessary to administer and observe the construction progress. Utility Director Westhuis stated that this is not a “not to exceed” amount, it is just an estimate and will go on time and materials and will try hard on keeping it below the $308,872. Westhuis addressed that they need time and resources to build a quality facility. MSA provided a detailed breakout of engineering fees they anticipate in the board’s packets.

The Wisconsin DNR keeps track of construction and bidding fees from consultants on WWTF projects funded by the Clean Water Fund. Based on that dataset, the estimated bidding and construction fees fall in line with the median costs for similar sized projects (see included cost curve). MSA does not base its fees on the total project cost, rather, it develops them from the ground up, based on experience and using the personnel and time necessary to meet the clients expectations and produce a quality project. Mr. Lundgren showed the board the projected savings from the new project with an annual energy savings of $30,000, a labor and replacement parts savings and hauling and tipping costs for sludge treatment of up to 10% in potential savings (current annual hauling and tipping fees - $300,000).

MSA respectfully requested the Utility Advisory Board to consider recommending the bid award to Miron Construction for $3,751,207 and recommended establishment of a 5% contingency fund. They also recommended the proposed engineering service contract in the amount of $308,872.

Mr. Lundgren asked the board if they had any comments or questions for him. Board member Odeen asked if this project was projected to be finished by mid-December 2016. Lundgren confirmed that they will be starting the project as soon as the Council awards the bids and services with a final completion date of December 2016. Board member Gagne commented he visited the WWTF with Kevin and WWTF city staff and it was good to see some of the safety concerns that staff had are being addressed in this project as well as the energy efficiency upgrades and savings with the new indoor facility. Utility Director Westhuis also commented that there will be reduced odor in the spring time as well with these new upgrades. Gagne asked Westhuis to explain to the viewers at home the two parts of this construction bid. Westhuis explained that the first part, the

3.75M, is for the actual construction of the facility and the $308,872 portion is for the administration and management of the project; getting engineers on the site, construction observation, staking, construction meetings and making sure the project is being built correctly, staying safe and staying on schedule. Finance Director Julie Bergstrom stated that there is a 20 year sewer revenue bond and plan to pay for the project. This will be going to the City Council in a week.

Utility Advisory Board Member Odeen moved approval for resolution no. 2016-04 recommending the contract for construction and construction management services for the WWTP modifications. Advisory Board Member Beebe seconded the motion and the motion passed.

3. Resolution to Extend WPPI Contract: Beebe stated that we had good discussions at the joint meeting in January and Tom Paque is here to answer any questions. Utility Director Westhuis reminded the board and the community watching at home that he started engaging the board in late September of this year through December and then in January of 2016 held a joint workshop with City Council where the boards were able to ask questions to WPPI and WPPI gave them a presentation on the contract extension as well.

Gagne asked Westhuis to briefly explain the benefits of this partnership with WPPI (member utility owned as opposed to privately owned companies). Westhuis stated that the Municipal Utility model that we're in right now is beneficial to the citizens of River Falls for several reasons. Being part of WPPI allows members to continually negotiate for good solid stable rates that are in compliance with state and federal standards. Westhuis also stated that this is a local municipal utility being governed by local policymakers like the Utility Advisory Board where the voice of the community is heard and the utility is continually giving back to the community. Gagne stated that the thing he likes about local municipal utilities is when he has a question on his bill; he can walk into city hall and get his questions answered face-to-face. Gagne asked Westhuis who makes up the voice of the advisory board and community to WPPI. Westhuis stated that we are fortunate in River Falls. There is a board of directors with WPPI Energy and every participating member is on the Board of Directors. There is also an Executive Committee with 11 members, which Westhuis is one of them. The boards have a direct influence on decisions that are going on. Odeen commented that she likes local control that is created by having a municipal utility and also likes the partnership with WPPI especially being that this is a contract that she won't see the end of so the UAB and City Council really wanted to make the right decision for future generations. She appreciated all the information and helping them through the process.

Utility Advisory Board Member Gagne made a motion for approval of resolution no. 2016-05 recommending the City Council to approve amendment no. 2 to the long term power supply contract with WPPI. Advisory Board Member Beebe seconded the motion and the motion passed.

Tom Paque of WPPI Energy thanked the board and the members for their commitment to WPPI. Without the commitment of the members, WPPI Energy is nothing. Paque recognizes that this was a big decision and really appreciates the action the board took. Mr. Paque stated he gets to see a lot of communities across the state and said that RFMU has a really well run utility and is a special utility and they have been leaders in WPPI for 30 years.

REPORTS:

4. Finance Report: Finance Director Bergstrom stated that the financials will be available at next month's UAB meeting. Bergstrom apologized for not having them ready but wants to provide the board with the best information and it wasn't ready for this meeting.

5. Utility Dashboards for, Electric, Water, Waste water and Powerful Choices were included in the UAB Packets. Westhuis pointed out that we have had only two customers affected by electric outages to date. Gagne stated that most of the outages are caused by squirrels. Westhuis said that 65-70% of outages are caused by squirrels or animals. Westhuis stated that tree trimming is happening now and have sent out 2,000 notices for the tree trimming to customers. Gagne stated that he went on a utility tour with Westhuis and checked out all the wells and booster stations to gain knowledge in what is going on. Gagne took a look at well #6 and it was nice to meet Greg, Bill and Ron and they were very professional and know there stuff. Beebe agreed with Gagne and when he has worked with the water department on freeze-ups or problems the staff is always so helpful and professional. Westhuis stated that they did a 30 minute presentation at the last City Council meeting on RFMU's water system and the quality of our water. It is published on the City of River Falls' YouTube channel if any citizens would like to view it.

6. Monthly Utility Report was included in the UAB packets for review. Gagne asked if the loan program that was approved for the community solar is currently in play. Westhuis confirmed the loan program was available for the purchase of solar panel(s).

   Westhuis reminded the board that the painting and reconditioning of the Sycamore water tower will happen later this year around June 1st.

ADJOURNMENT:

M/S Thumb/Myszewski moved to adjourn at 7:07 p.m. Unanimous.

Reported by: Kristi Hartmon, Administrative Assistant

____

Wayne Beebe, Secretary

POWERFUL CHOICES

a sustainable energy project for river falls

MINUTES
February 11, 2016
Riverwalk Art and Antiques Cafe
12:00 p.m. – 1:00 p.m.

Committee members and guests present: Mike Noreen (RFMU), Dave Engstrom (SCV-Habitat), Kayla Ludwigson (SCV – Habitat), Chuck Eaton (RFSD), Jill Coleman Wasik (UWRF), Nathan Croes (City of RF), Peter Morsch (St Croix Energy Solutions), Mark Klapatch (UWRF), Jennifer Mueller (RFSD), Matt Fitzgerald (UWRF), Aleisha Miller (Miller Escapes), Jim Cooper (SCV Habitat), Rebecca Ferguson (Resident/ First Cong), Debbie Murtha (SCV – Habitat) Natalie Benusa (RFSD), Angela Schoettle (CAB & FNB), Erin Tomlinson (Tomlinson Financial Services), Todd Schultz (RFSB), Karen DesLauries (RFSB), Russ Blasius (Westconsin Credit Union), Weston Arndt (WPPI) and Rhonda Davison (RFMU)

Mike Noreen welcomed everyone to Powerful Choices and explained that this is an advisory group on sustainability. Everyone is welcome and there is no membership. Mike asked for the minutes to be approved for the January 14, 2016 meeting Matt Fitzgerald made a motion and Rebecca Ferguson seconded the motion. Minutes were unanimously approved.

1. Utility Box Beatification project

Mike provided the background on this project that began last year. The Community Art Base (CAB) and Powerful Choices provided $2,000 each for the painting of the four utility boxes in 2015. $500 was given to each artist whose art was selected to be painted on a utility box. These funds were to be used for supplies and materials for their project. The boxes were determined by their high visibility. Artists submitted a total of 10 ideas for this project. A small committee was selected of Powerful Choices and CAB members to review the submitted artwork and narrow it to the top 4 that would appear on the preselected utility boxes.

Mike shared some of the feedback from last year's event: Artists wanted more time, artists wanted the utility boxes primed, elected officials wanted input, and some wanted to know when the artists were painting so they could visit them, staff felt we needed more pictures from the artists so we could market it better.

Mike asked the group to look at a packet with 7 highly visible utility boxes for 2016 Utility Box Beautification project (Horizon Chiropractic, Baseball Stadium, Walgreens, Kwik Trip North, Family Fresh, Copper Kettle, and the Safe Room). The group attending today's meeting took a few minutes to discuss and vote on their top sites. Not included is a potential UWRF location. The sites selected were Kwik Trip North, Horizon Chiropractic, Baseball Stadium, and UWRF or Copper Kettle as an alternate. Included in the discussion was if there should be a theme or not and maybe based on the location a theme could be suggested. Having themes could limit the artists submitting ideas. Some of the ideas suggested for themes were Medical for the one near the chiropractic office, River Falls, Biking, Kayaking, also artist choice as we have many talented artists with great ideas. It was also suggested that the projects be signed and dated adding value to each of the pieces. Mike was asked if any of the utility boxes had been vandalized and he said that one was but also said that each box is seal coated to help in the removal of graffiti.

The River Falls State Bank and Westconsin Credit Union are interested in having the utility boxes on their property painted and will explore if these businesses will be interested in funding the painting of their own utility boxes as they did not make the high visibility selections this year.

2. Home Energy Report – Weston Arndt (WPPI Energy)

Weston handed out sample copies of the Home Energy Report that is sent to RFMU Residential Customers. He briefly went through the samples explaining how to read this report pointing out specific areas where changes could be made. The group reviewed the report and suggested some potential changes that could improve the information being provided. Some of the suggestions were to include information about the Community Solar Program, comparing similar homes to each other, showing homes that are more efficient, comparing homes to homes in the Eco Village, continuing to promote Focus on Energy rebates as well as rebates offered by RFMU, home energy audits, implementing a rewards or award program for households that have most improved/reduction in electric and water usage, advertising our Customer Appreciation event, CFL's vs LED's educational information to help customers make a more informed choice, rental vs homeownership, high impact things that households can do to reduce their bill, grading homes with emoji's, and quick facts on water being wasted. Some of the concerns that were discussed is the fact that some homes use all electric and some use a combination of natural gas and electric making it challenging to compare usages, rental vs homeownership tenants may not be as energy conscious and tenants do not have the ability to upgrade things that would have a major impact on reducing consumption, and some households may be offended by the use of emoji's causing negative feedback.

This report is mailed from WPPI and many attendees said that they would read the report, some said they would rather it was emailed, and it was determined that many who should look at the report would treat it as junk mail. Weston appreciated all the great ideas and discussion from the group and will take some of these suggestions and make updates to the report before it is sent out to our customers.

3. Other items of

- Jill Coleman Wasik (UWRF) – Reminds us that the St Croix summit will be held at the UC on the UWRF Campus starting March 22, 2016. There will be a poster session where they hope to showcase things happening in River Falls such as the Eco Village and other Businesses and Nonprofits are welcome and encouraged to participate. They hope to have about 200 people attending. The fee to attend is $65.00. Jill mentioned that if a group submitted a poster that the organization may receive one free ticket. Mike Noreen reminded everyone that Powerful Choices has scholarship funds to pay for these kinds of events and other trainings. Often these funds are not used.
- Women in STEM was held Hudson Middle School on 4/16/16 from 1:00-5:30

Meeting minutes were taken by Rhonda Davison

West Central Wisconsin Boisolids Facility

Commission meeting minutes

January 19, 2016

Meeting was called to order by Gary Newton at 8:36 am.

Board members present: Greg Engest, Gary Newton, John Bond, Kevin Westhaus, and Steve Skinner

Other present: Chris Moan, Rich Bignell, Joe Beaudry, Eugene Laschinger

Consent agenda:

Motion was made to approve December monthly bills. M/S Steve/John

Motion was made to approve December meeting minutes. M/S Greg/John

Financial Report:

Randy reviewed the December financial reports. Motion was made to approve the December financial reports. M/S Greg/John

Facilities Report:

Chris Moan started facility report. He stated that the different dryer had been installed into the storage area. He is working on satisfying the required EPA standards for class a sludge. Chris is hoping the unit will treat 600 pounds of sludge in 30 minutes. He talked about the dryers drying capacity and cost of unit. Chris said the current size unit would run about $275,000 to purchase but the operational costs are high. Working to incorporate an infrared drying unit would help to lower the operating cost. Right now as it is the operating cost are going to be too costly to operate.

Randy gave the facility report. He stated the pounds were down 2% and gallons up 1% for year. Process has been going well. Centrate quality has been good. Truck scale inspection went good everything is working as it should. The coating applied to the scale two years has help prolong the service of the scale. Electric Pump has been out to repair sludge mixing pump for warranty repair. Motion was made to approve two year maintenance agreement from Centrisys for both centrifuges. M/S Greg/John

Old Business:

December health care expense discussion was tabled until a meeting with J.A. Counter is scheduled to explain situation better.

Eugene Laschinger from Town and Country Engineering updated on the Scada system project. He stated the project is about 30% complete on the Scada portion. B&B Electric is 40% complete with their portion of the project. The contractor has been great to work with. Test run or simulation of the Scada system is set for February 11th at L.W. Allen facility.

New Business:

Aquarius Technologies Inc. has approached Randy about running a pilot at the facility. Randy presented company literature and no further action was discussed.

Miscellaneous:

Next commission meeting attentively set for March 1st.

Adjournment:

Meeting was adjourned at 10:15am. M/S Greg/Steve

MEMORANDUM

TO: Utility Advisory Board

FROM: Raymond French, Management Analyst

DATE: March 21, 2016

TITLE: **Sediment Assessment Report – Hydro Relicensing**

BACKGROUND

The Utility Advisory Board approved an agreement with Inter-Fluve for sediment analysis services not to exceed $49,689 at their July 20, 2015 meeting. Through the initial stages of the relicensing process for the River Falls Hydroelectric Project (P-10489) in consultation with stakeholders, and as the City began discussions on the Kinnickinnic River Corridor Planning process, the quality and characteristics of the sediment in Lake George and Lake Louise were identified as key questions for helping understand the various paths forward. The City at that time committed to an initial directed study of the sediment analysis

The primary goal of the sediment analysis was to identify the costs and methods for sediment management if the city were to pursue dam removal in the future at one or both hydroelectric facilities. This included an initial assessment of sediment volumes, targeted sediment sampling and analysis, and a discussion of the sediment management options available to the City.

Stakeholders provided consultation on the review of proposals and the recommendation of Inter-Fluve to the Utility Advisory Board, and they provided comments on the Sediment Sampling Plan in October prior to the samples being taken in November. Additionally, the Wisconsin Department of Natural Resources (DNR) and members of the local chapter of Trout Unlimited reviewed and provided comments on the Final Sediment Assessment Report.

DISCUSSION

The results of the sediment analysis are provided in the attached report from Inter-Fluve, titled the *Lake George and Lake Louise Sediment Assessment Report*. The report reviews each step of the study including the sediment volumes field work, results of the sediment contamination study, and a discussion of sediment management options.

Sediment management scenarios are further discussed in the report as part of the primary goal of this study. The study revealed that, in the case of dam removal, some combination of active and passive management will be necessary. It is also estimated based on past experience in

Wisconsin dam removals and the characteristics found in the sediment at these sites that less than 10% of the total volume of potentially mobilized sediment would need to be actively managed, at approximately $350,000 or less. The actual costs and sediment management scenarios used would depend on the design and construction of dam removal and regulatory guidance of the process. However, this figure brings clarity to the "high" cost of sediment management in dam removal contained in the December 9, 2014 licensing alternatives report prepared by TRC.

The Inter-Fluve study also identified that if the dams remain in place, it is unlikely that there will need to be any management of the sediment. This information will be helpful going forward through the relicensing process.

Based on a preliminary review, the Wisconsin DNR recommended additional sampling to help better inform sediment management decisions of the impoundments. They include two samples 75′ up- and downstream of LL-C1 in Lake Louise, segmented at two-foot intervals, to be analyzed for total arsenic; and one sample 75′ upstream of LG-C2 in Lake George, segmented at two-foot intervals and retained the remaining sample, to be analyzed for 18 individual PAHs and TOC. These recommendations will be incorporated into any future dam removal feasibility studies.

Marty Melchior from Inter-Fluve will be making a brief presentation of the results at the meeting and can answer any questions you may have.

CONCLUSION
The sediment study of Lake George and Lake Louise is complete and the Sediment Assessment Report is attached to this memo.

Lake George and Lake Louise Sediment Assessment Report

SUBMITTED TO
City of River Falls, WI

PREPARED BY
Inter-Fluve, Inc

March 14th, 2016

CONTENTS

Introduction

The City of River Falls currently holds a license from the Federal Energy Regulatory Commission (FERC) to operate the Junction Falls (Upper) and Powell Falls (Lower) hydroelectric facilities. The City recently completed an evaluation of the FERC relicensing process and is now pausing relicensing in order to fully evaluate alternatives. To this end, they contracted Inter-Fluve to evaluate existing sediment conditions in the upper and lower impoundments, Lakes George and Louise, respectively (Figure 1). The main focus of the work was to assess the quantity and quality of impounded sediment behind both dams, and to determine the potential volume of sediment that may be evacuated or need to be excavated in the event of dam removal.

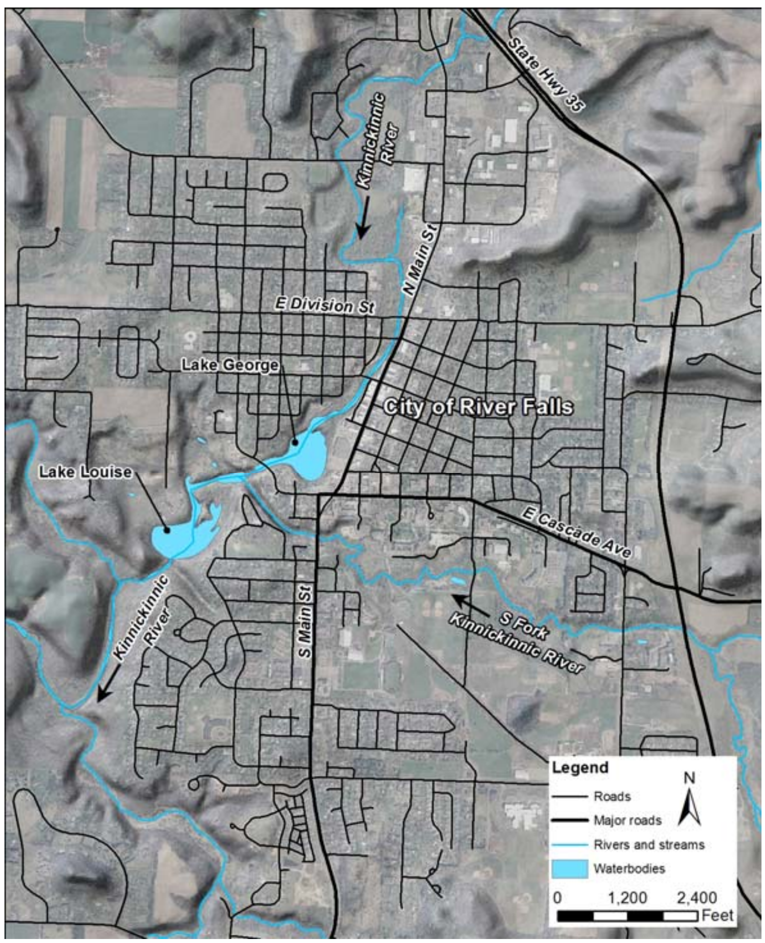


Figure 1. The Kinnickinnic River at River Falls showing the location of the two impoundments, Lake George and Lake Louise.

Sediment Volume Assessment

METHODS

Field assessment of existing impounded sediment composition and volume was completed using bathymetric surveys and sediment depth probing, also known as depth-to-refusal probing (Figures 2 to 4; Appendix A). This information was updated with coring data from the contaminant sampling effort. The bathymetric survey and refusal depth probing in Lake George consisted of 15 transects across the channel and impoundment bed with a survey-grade rtk-GPS unit (Figure 2). In Lake Louise, 15 GPS and refusal transects were supplemented with single beam sonar data to describe areas with deeper water. The sonar requires a minimum depth of three feet which was only present in the thalweg of Lake Louise. Extensive aquatic vegetation and shallow depths throughout the rest of Lake Louise and most of Lake George prohibited further use of sonar equipment.

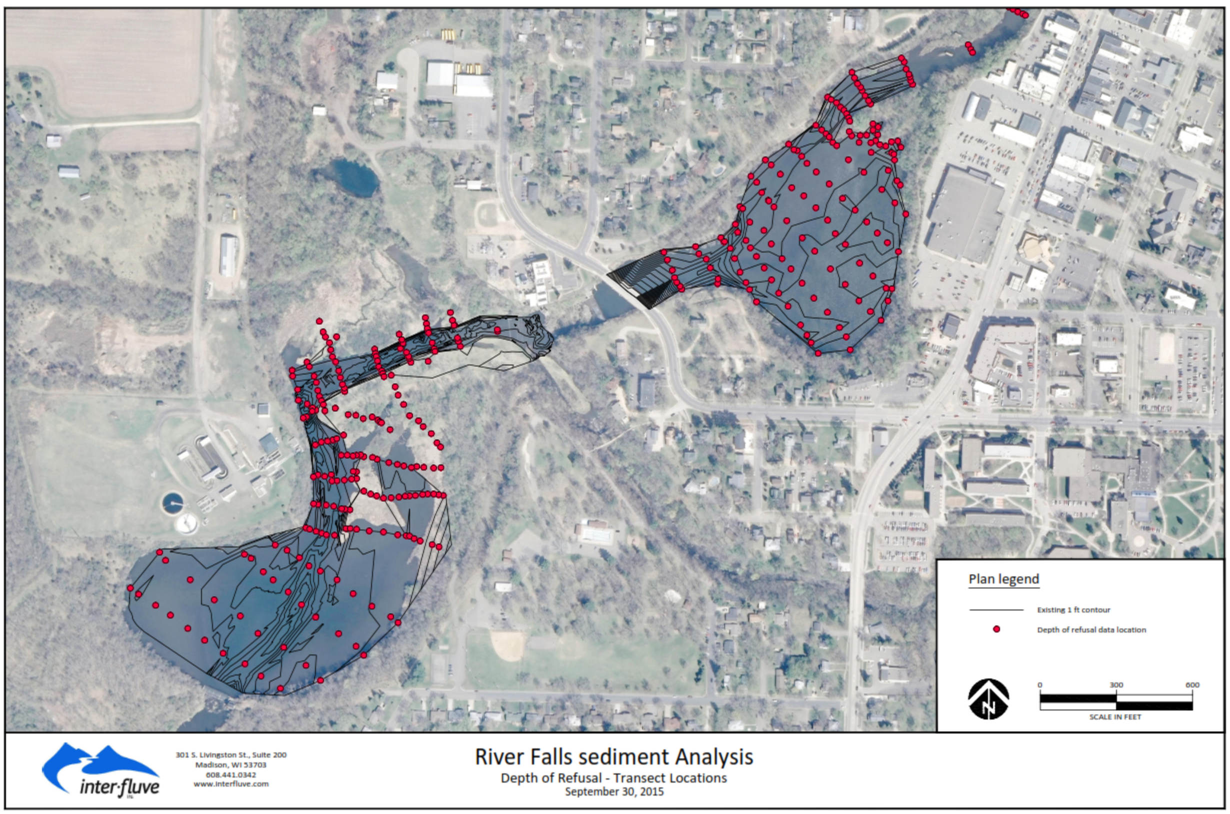


Figure 2. GPS and depth to refusal survey locations in Lake George (right) and Lake Louise (left). For more details, see Appendix A.

At each survey point along the GPS transects, a graduated rod was driven into the sediment until a resistant material (gravel, rock or clay) prohibited further advancement. This final depth is the "depth-to-refusal," which typically represents a pre-dam channel bed or floodplain surface. In the River Falls impoundments, rock was the refusal material generally encountered along the expected pre-dam channel alignment. A firm, compact silt/clay layer was encountered in locations likely occupied by floodplain prior to dam construction.

Survey data were integrated in AutoCAD® Civil3D® to create an existing conditions surface of the impoundment beds (top of sediment surface) and a pre-dam surface based on the refusal data. The data were adjusted using the National Geodetic Survey's Online Positioning User Service to relate the North American Vertical Datum of 1988 and the Wisconsin State Plane, Central (NAD83, US survey feet) coordinate system.

The difference between the existing and pre-dam surface models approximate total accumulated sediment volume in each impoundment. In Lake George, sediment accumulation in the three upstream cross sections was added by estimating sediment deposition along cross sections and multiplying by reach length.

We also estimated the expected volume of sediment to be mobilized if dam removal occurs. Based on general channel form of the Kinnickinnick River up- and down-stream of River Falls, a channel width of 55 feet was specified along the thalweg alignment identified from the DOR analysis. From the edge of this expected channel, the surface was graded upwards at a 3:1 (horizontal:vertical) slope until the existing bathymetric surface was reached. The 3:1 bank slope represents an idealized trapezoid for estimating purposes only, and does not necessarily represent the final bank configuration.

LAKE GEORGE

The total estimated volume of impounded sediment in Lake George was 166,800 cubic yards. Because depth to refusal probing does not directly determine the exact stratification line between historic floodplain and deposited sediment, this estimate is likely conservative and (or) provides an upper bound the stored sediment volume. This estimate includes sediment between the Winter St. Bridge and the E. Division St. Bridge. The majority of these sediments are sands (~80%) with a significant portion of fines (silts and clays; ~20%, see Appendix B for grain size data). Within the impoundment, sediment sizes are somewhat consistent. As the impoundment narrows at the upstream end of Lake George, the impounded sediments transition to sand. Although the wetted width upstream of the main pond suggests riverine conditions, there is little water surface gradient and sediments deposit easily.

Under a passive management scenario in Lake George, most of the mobilized sediment will likely come from the channel identified during the DOR assessment. If we assume the delineated channel (i.e., 55 ft wide, 3:1 side slopes, historic pre-dam channel gradient) defines the area of sediment mobilization, an estimated 73, 900 cubic yards of material could transport downstream. It should be noted that an evacuation channel with 3:1 side slopes represents an idealized trapezoid used for modeling and estimating purposes. The exact bank angle that would result depends on actual sediment character, cohesion and natural angle of repose, all of which will vary slightly throughout the impoundment. We estimate that the sediment evacuation volume will come from the west side of the impoundment, where the historic channel alignment is most likely to be recaptured. Although various drawdown scenarios can control the rate and volume of sediment loss to a degree, all of the sediment would likely mobilize as a headcut or nickpoint moves through the impoundment. This would happen regardless of the drawdown method. Under a staged drawdown, the sediment movement would be metered and occur more slowly, whereas under a rapid drawdown, the sediment would likely evacuate more rapidly. Sediment evacuation rates from rapid drawdown are not predictable, however, as sediment movement in rivers is event based, and not stochastic. It is unlikely that additional sediment would mobilize within Lake George as the refusal surface on the east half of the impoundment is perched relatively high compared with the thalweg along the west perimeter of the lake. During subsequent engineering phases, hydraulic analysis of proposed conditions can more accurately estimate the likelihood of sediment movement on the floodplain and downstream sediment transport volumes can be better defined.

Historic sedimentation in Lake George – Inter-Fluve compared the bathymetric data collected as part of the 2006 study and the data collected in 2015 as part of this effort. The results suggest possibly 0 - 1.0 feet of erosion along the eastern edge of the impoundment, and 2-3 feet of deposition in the main channel area. The remainder of the impoundment showed no significant change. Overall, it appears that the current impoundment has roughly the same or slightly less sediment than in 2006. We have no defined vertical datum for the 2006 study, and so the data and any conclusions regarding changes from 2006 to 2015 must consider a small amount of variation from actual. Most surveys use the standard NAVD88 vertical datum, and the difference between NAVD88 and NGVD29 is only 0.1 feet in Wisconsin. Although subject to interpretation and changing water levels, comparison of aerial photos of Lake George over the past several decades echo the survey data, and showed no obvious change in sediment deposition patterns.

LAKE LOUISE

The total estimated volume of impounded sediment stored in Lake Louise is 163,800 cubic yards. Sediment sizes vary depending on the sampling location, with the upstream channel portion of the impoundment comprising medium to coarse sand, but the pond samples consisting of roughly 65% sand and 35% fines (fines – less than 0.063 mm diameter (organics, clay, and silt); Appendix **B**). Some of this incoming sand may be introduced from both the main stem and the South Fork Kinnickinnic River which enters the main stem just downstream of the upper dam. The majority of this sediment is in the lower two thirds of the impoundment. In the upstream reach just downstream of the bedrock control of the Lake George Dam (Junction Falls), where the channel width is 150 ft or less, relatively little sediment is stored, and most of the channel material is coarser sands or larger clasts. Larger cobbles perched on the floodplain suggests that this reach has been dredged in the past to deepen and straighten the channel between the Junction Falls Dam and the City's wastewater treatment plant, cutting off a large meander bend.

Based on a 55 ft wide channel along the alignment through the lowest refusal surface elevation, we estimate a sediment evacuation volume of approximately 45,100 cubic yards under a passive sediment management approach. It is unlikely that additional sediment outside of this channel area would mobilize within Lake Louise, given the stable, groundwater dominated hydrology and higher floodplain elevations. During subsequent engineering phases, hydraulic analysis of proposed conditions can more accurately estimate the likelihood of sediment movement on the floodplain.

For this estimate, we assume the Lake Louise channel going through the alignment as shown in Figure 3. Depth to refusal probing at location LL-C1 (Figure 4), just upstream of the dam, suggests a sediment depth from top of sediment to refusal (rock) as being 12.8 feet (refusal at elev. 806). Sediment vibrocoring often has difficulty penetrating historic floodplains, and at this location, the vibrocore sampled to a depth around 4.5 feet below the sediment surface. This places the historic floodplain at elevation 814-816 ft, roughly 2 to 4 ft above the expected waterfall crest at around 812 ft. The exact waterfall crest elevation won't be known until dam removal, and the exact channel alignment may vary upon final design, but will not increase the total volume of expected sediment mobility. If the most recent historic channel is in fact down the center of the pond in accordance with existing bathymetry, then the evacuation volume will be reduced.

The total sediment volume expected to evacuate from the two impoundments is thus 119,000 cubic yards. This assumes no sediment storage within the Lake Louise impoundment. It is possible that some sediment storage could occur in the Lake Louise impoundment, particularly if flood events were to occur that could mobilize sand or finer particles to the lake margins where mobilized sediment could drop out of the water column. Sediment storage in Lake Louise would also be more likely if the Lake George impoundment was drawn down before the Lake Louise impoundment. Sediment deposition is dependent on sediment grain size, cohesion, channel velocity and depth during flows, channel slope (which changes as drawdown proceeds), flooding and drawdown method used.

Sediment transport dynamics are complex. With dam removal sediment transport modeling, it is possible to estimate how much storage could be realized under various input parameters for flow. However, such models are expensive to run ($50,000 minimum) and are often no more accurate than simple geomorphic assessment ballpark estimates, and the hydrologic input parameters are conjecture. One can input a wet, normal or dry year scenario, but there is no way of predicting what kind of hydrologic year will actually occur.

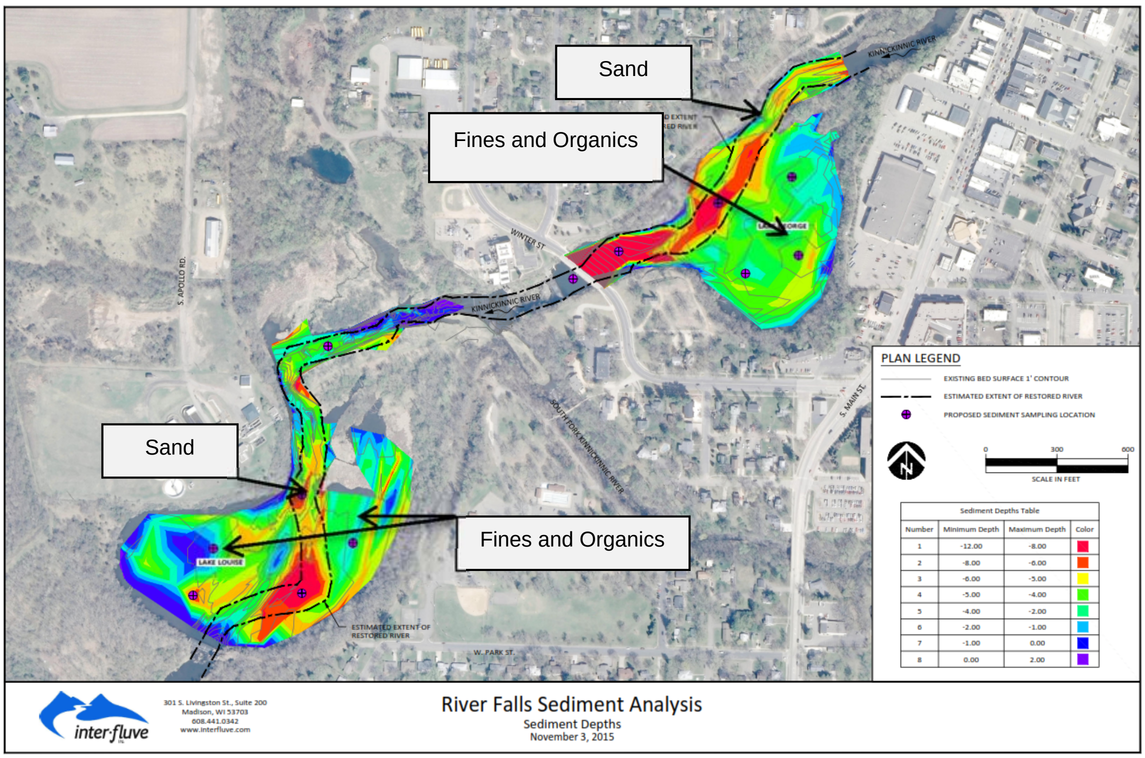


Figure 3. Topography/bathymetry and sediment thicknesses and types for the River Falls Impoundments. For more details, see Appendix A.

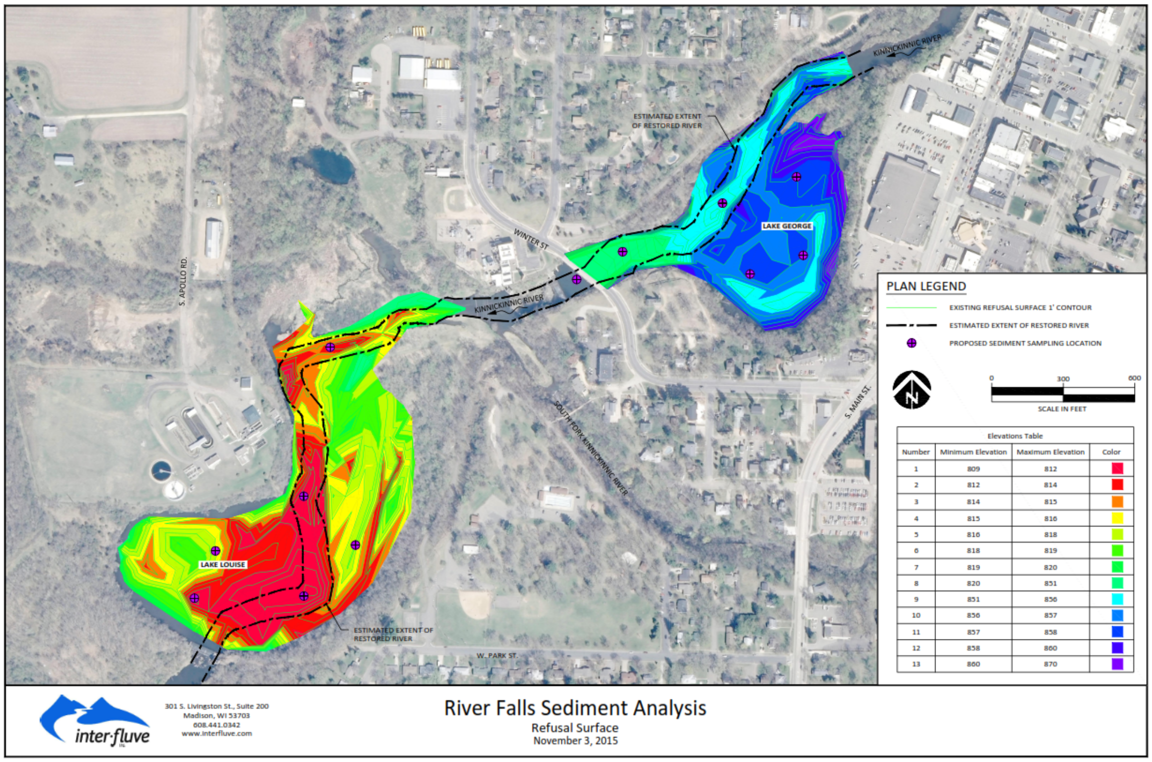


Figure 4. Depth of refusal surface for Lake George and Lake Louise. For more details, see Appendix A.

Sediment Contamination

The River Falls dams act as sediment traps. The reduced energy in the impoundment not only limits transport of coarse sediment, but also creates areas where fine material, including silt, clay, and organics, can fall out of suspension and accumulate. Pollutants often adsorb to fine material, so contaminant concentrations may be elevated in dam impoundments where these fine sediments accumulate, and lower in sand or gravel impoundments. To determine the contaminant sampling density and location appropriate for regulatory review, Inter-Fluve developed a sediment sampling plan and submitted the plan for review by the City of River Falls, the Wisconsin DNR and interested stakeholders. Comments were incorporated into the final Sediment Sampling Plan (Appendix C)

To assess the magnitude and distribution of sediment contamination in the River Falls Impoundments, sediment samples were collected at 12 locations, including six sites in each impoundment (Figure 5). The samples were analyzed for a range of inorganic (e.g., metals) and organic (e.g., PCBs, PAHs) pollutants as well as physical characteristics (Table 1).

DUE DILIGENCE SUMMARY

As part of the sediment sampling plan development, and to determine the appropriate sediment quality testing regime for Lakes George and Louise, Inter-Fluve completed a due diligence review of potential upstream contaminant sources. We reviewed watershed landuse and potential point sources of contaminants such as large chemical users, historic spills, underground utilities, and storage tanks listed in various government databases. The following details the results of our search:

1. The Wisconsin Bureau for Remediation and Redevelopment Tracking System (BRRTS) is a searchable database containing information on the investigation and cleanup of potential and confirmed contamination to soil and groundwater. This search revealed 30 small incidents within the watershed upstream of the River Falls Dams, featuring primarily unleaded gasoline, oil, and VOCs. No major spills or incidents have occurred within the watershed, and the small sites have since been addressed and closed
2. No USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) or No Further Remedial Action Planned (NFRAP) sites were found.
3. Of the 103 small waste quantity generator sites found in the Resource Conservation & Recovery Act of 1976 (RCRA) database, no major violations or outstanding corrections were found.
4. There were no Superfund sites on the National Priorities List (NPL).

The due diligence results indicate the likely presence of minor contamination typical of urban areas, including heavy metals and hydrocarbons. The agricultural land use in the watershed also suggests the presence of nutrients, and organochlorine pesticides and herbicides, including DDT, DDE, and derivatives. Some contaminants may also be released from the waste water treatment plant which discharges to the river directly upstream of Lake Louise.

The Inter-Fluve scope of work and budget did not allow for historic record searches of possible contaminants beyond those found in commonly used environmental databases such as RCRA and NPL. However, the sediment contaminant sampling suite included a wide range of chemicals commonly found in historical industrial and agricultural areas.

SAMPLE LOCATIONS AND METHODS

Sampling and sample handling methods were consistent with protocols and methods in Inter-Fluve's *Sediment Sampling for Dam Removal Projects* (Appendix B), based on EPA and WI state methods for sampling, and Wisconsin Administrative Code NR 347.06. Sample locations are shown in Figure 5. At the shallower sites (less than 5 feet of sediment), samples were collected with a 3 inch diameter polycarbonate push corer, and included vertical, continuous lengths of the total sediment thickness. No layers or obvious transitions were observed in the sediment samples, but at each location, the samples were split into an upper 1 ft section (sample A) and the lower section (down to refusal; sample B) in order to differentiate contamination at the surface from contamination at depth. Splitting the samples in this manner allows us to assess contamination of the sediment that would likely be exposed if the dam is removed. One exception was sample LL-C1, where the sample was split where the sediment shifted from medium and fine sands in the upper 3 ft to coarse sand below. Upon retrieval, each sediment sample was thoroughly mixed in a stainless steel bucket, placed in containers supplied by the laboratory, and stored on ice until they reached the laboratory.

Sample collection in deeper parts of the impoundments and where sediment was too thick to sample manually was conducted from a pontoon boat mounted vibratory core sampler by Affiliated Researchers (East Tawas City, MI). A 3-inch diameter, 12 ft long polycarbonate tube fitted with a core catcher was driven by submersible vibrocore head until refusal for the equipment was reached. Sediment cores were retrieved, brought to the shore and then processed by Inter-Fluve personnel. Deep sediment cores showed no obvious stratification, and were separated into the top 2.0 feet, and the remaining sediment depth. Core depths for each sediment core are shown in Table 1.

The sediment sampling plan was reviewed by project partners the WDNR. A draft sampling plan was generated by Inter-Fluve based on Inter-Fluve's prior sediment sampling plan experience with impoundments in several states, including Wisconsin. The project budget for sampling would not allow for stratification sampling of all samples, so the final approved plan included stratification of only floodplain samples. Floodplain layers were separated for laboratory analysis, but channel cores were submitted to the laboratory as whole cores. Floodplain stratification generally showed more obvious detrital and organic layer, whereas channel cores showed poorly defined stratification.

Table 1. Coring depths

Lake George	Core Depth	Top layer stratification	Appro . depth to refusal
LG-C1	11.2 ft	2.0 ft	15 ft
LG-C2	10.2	2.0	13.7
LG-C3	8.3	2.0	11.4
LG-F1	4.0	1.0	5.0
LG-F2	3.8	1.0	5.0
LG-F3	4.5	1.0	5.0
Lake Louise			
LL-C1	4.5	2.0	4.5
LL-C2	4.2	2.0	5.8
LL-C3	3.5	1.0	4.0
LL-F1	4.2	2.0	4.2
LL-F2	4.0	1.0	4.0
LL-F3	4.0	1.0	4.0

The samples were analyzed by CT Laboratories (Baraboo, WI) for a specific set of EPA priority pollutant metal and organic contaminants, as well as physical character using standard laboratory methods (Table 2).

It is noted that the upper core depth stratification varies from 1-2 feet. This stratification was based on site conditions. Clear sampling tubes were used to aid in identifying lamination or natural stratification. Where we observed a lamination or significant change from an upper organic layer to a denser layer below, we separated the samples accordingly in accordance with WDNR guidance. This was an attempt to isolate finer, more recently accumulated organic material from older, denser alluvially derived deposits and historic floodplain sediment.

Table 2. Analytical Parameters for Each Sample with > 5% Fines (i.e., <0.063 mm diameter)

Category	Specific Parameters	Laboratory Method
Metals	As, Cd, Cr, Cu, Pb, Ni, Zn Hg	EPA 6010C EPA 7471B
Organics	PCBs PAHs organochlorine pesticides Oil and Grease	EPA 8082A EPA 8310 EPA 8081B EPA 9071B
Physical	Particle size (sieve) Percent total organic carbon (TOC)	ASTM C136-84A L-Kahn/9060A

PCB – polychlorinated biphenyl
PAH-Polycyclic Aromatic Hydrocarbon

SEDIMENT GRAIN SIZE ANALYSIS

Active Channel Samples

Sample locations LG-C1, LG-C2, and LG-C3 were located along the main channel of Lake George, from about 300 ft downstream of the river's entrance into the impoundment to 80 feet upstream of the dam (Figure 5). In Lake Louise, LL-C1, LL-C2, and LL-C3 represent main channel conditions. LL-C3 lies 750 ft downstream from Junction Falls; LL-C2 lies at the mouth of the main pond, 500 ft downstream from the waste water treatment discharge; and LL-C1 is 330 ft upstream of the Powell Falls Dam. Like most of the Lake George sediments, the active channel samples are relatively similar sands and fines (sediment less than 0.063 mm in diameter), although a little finer than the rest of the impoundment. Lake Louise samples LL-C2 and LL-C3 are primarily sand with little finer material (<1%, except LL-C3B which had 6% fines). LL-C1 is much finer (40% silts and clays).

Floodplain Samples

"Floodplain samples" represent conditions that will likely be floodplain after dam removal. They currently occupy shallow areas of the reservoirs, away from the existing and expected active channels. Lake George floodplain samples include LG-F1, LG-F2, and LG-F3, which run along the east side of the impoundment. Materials are primarily sand with 20% fines. LL-F1, LL-F2, and LL-F3 represent Lake Louise sediment conditions. LL-F1 and LL-F2 are on the west side of the impoundment, south of the treatment plant, and LL-F3 is on the east side of the impoundment. LL-F1 and LL-F3 contain sand with ~35% silt and clay, but LL-F2 contains a higher percentage of sand.

CONTAMINANT CONCENTRATIONS

Several state regulations exist to protect aquatic wildlife and (or) humans that come into direct or indirect contact with the pollutants in rivers (see chapter 30, Wisconsin Statutes.; chapter NR 345, Wisconsin Administrative. Code; and Chapter NR 347, Wisconsin Administrative Code). Aquatic wildlife, such as fish and macroinvertebrates, and humans can experience chronic and/or acute toxicity from direct contact with sediments in the water column or bed sediment. River sediments left exposed after dam removal or dredging can also pose risk of exposure. Direct contact to sediment pollutants by people may be possible depending on future landuse, burrowing animals may be exposed to contaminants, and runoff and infiltration can move both sediment-adsorbed and leached contaminants into groundwater and the river.

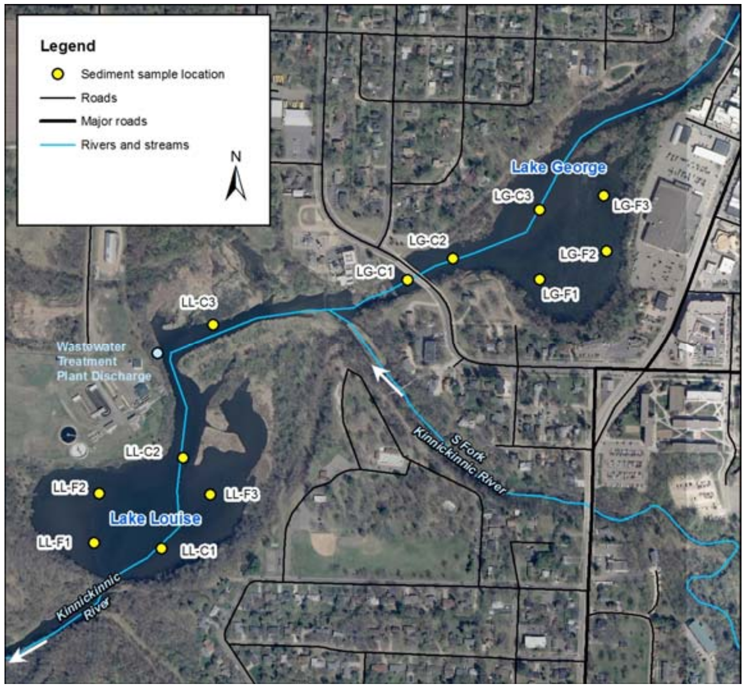


Figure 5. Sediment sampling locations within Lake George (LG) and Lake Louise (LL).

For sediment screening, the Wisconsin DNR uses census based sediment quality guidelines (CBSQGs) to determine the general ecological toxicity of sampled materials (WDNR 2003). If the sediment is mechanically dredged or removed, either to an on-site or off-site location, WDNR guidelines for disposal of dredged or excavated sediment or soils will need to be followed, and the thresholds governing their reuse may be determined by WDNR review (NR347, NR500 to 520). The CBSQGs include a lower (threshold effect concentration - TEC) and upper (probable effect concentration - PEC) effect level at which toxicity to benthic-dwelling organisms are predicted to be unlikely and probable, respectively. There is an incremental increase in toxicity as the contaminant concentrations increase between the TEC and PEC concentrations, with the MEC representing the mid-point effect concentration, although specific numerical values relating to the degree of toxicity are not derived. The TEC and PEC values act as a semi-quantitive descriptor system that provides a common basis of expressing relative levels of concern with increasing contaminant concentrations. We also included EPA screening levels for human health effects which are largely based on ingestion or inhalation of the materials at the given concentrations and do not represent environmental effects. The sediment quality data for the River Falls impoundments is provided in Appendix B.

These data suggest that the sediment within the ponds has contaminant concentrations generally less than their respective effects concentrations, although there were exceptions (noted below). Based on prior experience with Wisconsin impoundments, PCBs (Aroclors 1254 and 1260) were analyzed only in the upper floodplain cores, in accordance with WDNR recommendations. PCBs were detected in trace amounts in the Lake George and Lake Louise floodplain cores, with the concentration of Total PCBs in one core slightly exceeding the TEC. PAHs exceeded TECs in a few instances in both impoundments. In many cases, the detection limits exceeded threshold values so it is not possible to determine whether these compounds are causing impacts. Regulatory review of the contaminant values will be conducted and recommendations made regarding either additional testing or required handling of sediments.

In accordance with WDNR recommendations, organochlorine pesticide and herbicide sampling was completed in the LL-C2 sample only, as being representative of conditions downstream of the treatment plant effluent.

It is noted that 15 of the 18 PAH compounds had standardized detection limits (SDL) that were greater than the TEC, MEC and/or PEC values. Three factors modify the detection limits for solid-type sediment analysis matrix; the mount of sample used during preparation (if different from standard amount), the percent solids, and the dilution factor. The dilution factor is also applied to the SDL, which means that some analytes in a large array of chemicals will fall below the SDL. It is not possible for the laboratory to know which analytes may or may not end up having the SDL be exceeded. If desired, additional testing in future phases can clarify these contaminant concentrations.

Lake George Active Channel Sediments (LG-C1, LG-C2, LG-C3)

- Most of the inorganic analytes (trace metals) were detected within the active channel sediment, but concentrations were less than threshold effects concentrations (TEC) set by the Wisconsin DNR (WDNR 2003). The arsenic levels are elevated compared to EPA screening levels for human health concerns (which are primarily related to ingestion and inhalation).
- PCBs were not detected. Only one of three sampling sites was analyzed.
- Two PAHs, including benzo(a)pyrene at LG-C2 and pyrene at LG-C3, exceeded threshold effect concentrations. Ten PAHs, including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were detected but at levels below their respective TECs.

Lake George Floodplan Sediments (LG-F1, LG-F2, LG-F3)

- Most of the inorganic analytes (trace metals) were detected within the floodplain sediment, but concentrations are generally less than TECs. Mercury concentrations exceed the TEC at LG-F1B and LG-F3B (i.e., in the lower core sections) and lead concentrations exceed the TEC at LG-F2B. Arsenic levels are consistently elevated compared to EPA screening levels for human health concerns, while hexavalent chromium levels EPA screening levels for human health concerns in 3 of 6 sediment core sections.

- PCBs were detected at levels less than EPA screening values, and total PCB concentrations at LG-F2A (upper core section) slightly exceed the TEC (0.062 mg/kg).
- Benzo(a)anthracene concentrations exceed-the TEC at LG-F2A and LG-F2B. The pyrene concentration at LG-F2A (upper core section) exceeds the TEC. Other—PAH compounds, including benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and phenanthrene were detected but at levels below their respective TECs. However, concentrations of benzo(a)pyrene consistently exceed EPA screening levels.

Lake Louise Active Channel Sediments (LL-C1, LL-C2, LL-C3)

- Most of the inorganic analytes (trace metals) were detected within the active channel sediment, but concentrations are generally less than TECs. However, a high concentration of arsenic was present at LL-C1, exceeding the probable effect concentration (PEC). The cadmium concentration at LL-C1 exceeds the TEC. Arsenic concentrations exceed EPA screening levels for human health concerns at all three sites." According to the table, hexavalent chromium concentrations are less than detection limits; hence they cannot be compared to EPA RSLs (Residential).
- PCBs were not analyzed in Lake Louise active channel sediments.
- DDD levels exceeded the midpoint threshold effect concentrations (MEC) and Lindane levels exceeded the PEC. Other organochloro-pesticides and herbicides were below detection limits (sampled at LL-C2 only).
- Concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and phenanthrene exceed TECs at L:-C3, and flouranthene and pyrene exceed MECs. These contaminants were detected at levels lower than their respective TECs at the other two active channel locations. LL-C3 should be considered a site of concern.

Lake Louise Floodplain Sediments (LL-F1, LL-F2, LL-F3)

- Most of the inorganic analytes (trace metals) were detected within the **floodplain** sediment, but concentrations are generally less than TECs. However, concentrations of mercury and nickel exceed their respective TECs at LL-F1 and LL-F3. Arsenic levels at

LL-F1, LL-F2, and LL-F3 and hexavalent chromium levels at LL-F3 exceed their respective EPA screening levels for human health concerns.

- PCBs were not detected.
- Concentrations of benzo(a)anthracene, fluoranthene, phenanthrene, and pyrene exceed their respective PECs at LL-F2A, and the chrysene concentration exceeds its MEC at this location. The concentration of bnzo(a)anthracene exceeds the TEC at LL-F1A. Additionally, benzo(a)pyrene concentrations exceed EPA screening level (residential) at LL-F1A and LL-F2B. Other PAH compounds, including, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene were detected in Lake Louise floodplain sediments but at levels below their respective TECs. Based on total PAH concentrations, LL-F2 may also be considered a site of concern.

Sediment Management Options

The following paragraphs give a preliminary summary of possible sediment management actions. If the dams remain in place, the negative effects of the dams will remain in place, including solar heating and warming of water, the continuing accumulation of fine sediment, accumulation of organic matter and emergent vegetation growth (e.g. cattails) in larger areas around the impoundments, and continued sub-optimal habitat and water quality for riverine species. If the dams remain in place, then Inter-Fluve recommends no action regarding sediment removal. Leaving the existing sediment in place reduces water residence time and reduces warming.

If the dams are to be removed, then sediment management can involve either active management, passive management, or a combination of active and passive sediment management techniques.

Active versus Passive Sediment Management

Passive sediment management involves removing the dam and allowing the impounded sediment to mobilize and stabilize without intervention. This approach is low cost, as it requires little work in the impoundment to control sediment or develop more natural channel characteristics. This option requires an unknown amount of time for the river to reach equilibrium, as the river must evolve through erosion and sediment migration that may vary from years to decades. This approach will also have a negative short term impact on downstream reaches as mobilized sediment can temporarily inundate habitat.

Under an active sediment management scenario, at least some of the sediment within the impoundment is mechanically removed and channel form and adjustment is controlled via design and construction. Active management uses mechanical means to excavate sediment, create a stable channel form, and reestablish a higher degree of ecological function in a shorter time. These advantages are realized at a higher capital expense for the project.

Passive Sediment Management

Under a passive sediment management scenario, the dams would be breached or removed with little or no sediment management. The channel within the impoundments would freely adjust their slope and form via incision, widening, and meandering; and the resulting eroded sediment would flush downstream unimpeded. These adjustments would continue until the channel develops a form consistent with the flows and sediment regime imposed on it. The exact nature of sediment transport and downstream depositional patterns associated with sediment evacuation can be estimated through geomorphic assessment and expensive modeling, but is difficult to predict accurately. The rate of progression is event driven, meaning that sediment movement is governed by the magnitude and frequency of flows. These flows are statistically unpredictable.

The rate of sediment evacuation can be partially controlled by using a staged drawdown method of removal, in which only a portion of the dam's vertical height is reduced. Sediment in the upper impoundment is then allowed to transport either into the impoundment remaining, or downstream of the dam. Staged drawdown requires multiple mobilizations, and is thus more expensive, but can reduce environmental impacts by allowing sediment to meter out more slowly over time.

Once the sediment has moved out, and the channel has reached an equilibrium condition within the impoundment, both active and passive restoration methods can be used to construct habitat in and around the stream, and to revegetate the corridor.

For Lake George and Lake Louise, the existing channel through the impoundments is fairly well established. After removal, the channels would likely widen and possibly shift slightly to occupy the area predicted by the refusal depth and bathymetry survey analysis (Figures 2 to 4; Appendix A). Sediment in these areas is relatively fine; however, concentrations of arsenic and cadmium at LL-C1 exceed their respective PEC and TEC, and 10 PAH compounds exceed their respective TECs or MECs at LL-C3. The sediment and contaminants would have some short term impacts to downstream reaches that may persist for several years. However, these impacts need to be compared to the channel impacts within the impoundments over the entire life of the dams. Flows will largely be contained within the expected 55 ft wide historic channel, so any sediment not evacuated along the channel margin, such as within the rest of the pond, along the inside of bends, etc., would likely remain in place and revegetate. The sediment would revegetate over time, but invasive species such as reed canarygrass and *Phragmites* (giant reed grass) would likely dominate without intervention.

Active Sediment Management

The extreme version of this option includes removing all of the sediment in the impoundment, disposing of the removed material, and reconstruction of the channel and floodplain. This option is more costly, but it would result in the most immediate recovery of the stream, and would eliminate downstream impacts from dam removal.

Most projects lie along a spectrum between fully passive and fully active sediment management. Contaminant concerns often require spot treatment or removal of segments of deposition, thus precluding a completely passive approach. Cost implications often preclude a completely active management approach, and so some combination of the two management strategies is usually employed. Based on the current Kinnickinnic River impoundment morphology and contaminant distributions, passive management within the expected channel boundary combined with in-stream habitat enhancement and floodplain revegetation may be a viable option. If releasing the relatively low levels of sediment pollutants found in the main channel is undesirable, then localized areas of finer material within the expected post-dam channel area can be removed. This scenario may be desirable for the area around LL-C1 and LL-C3.

Sediment Management Costs

The cost of dam removal includes many factors, but is directly proportional to the size of the dam, the amount of associated infrastructure, and the volume and character of the impounded sediment needed to be actively removed. This study focused primarily on identifying contaminants in the sediment that could possibly trigger special handling requirements, which in turn affect the amount and thus the cost of *active* sediment management, but also have implications for passive sediment management. However, there may be other reasons for wanting to actively manage at least a portion of the sediment. The next phase of dam removal feasibility will examine other reasons, such as the following:

- Construction logistics – Demolition may require removing sediment from around the dam structure.
- Ecology – The impacts of transported sediment on mussels, macroinvertebrates and fish downstream of the dam must be assessed through sediment fate analysis. Short term impacts are then compared against long term benefits and incorporated into the final sediment management plan.
- Flooding – In rare cases, downstream sedimentation can impact flooding. Sediment transport analysis and hydraulic modeling are conducted to ensure that sediment accumulation does not affect regulatory flooding.

The unit cost for active sediment removal in a sandy impoundment typically ranges from $20-$40 per CY. This includes excavation and hauling to a nearby disposal facility. Using this range of costs, we have calculated the following preliminary potential costs for active sediment management for a variety of volumes. This assumes that special handling and disposal in a state or federally approved waste facility will not be applicable. Such requirements can increase the unit cost to $100 –$500 per CY. The amount of sediment to be removed depends on lake management goals under a dredging scenario, or river restoration ecological goals, floodplain restoration goals and permitting requirements under a dam removal scenario. The more likely dam removal scenario for the Kinnickinnic River would be a largely passive sediment management approach, with less than 10% of the total volume being actively managed during construction.

Table 3. Costs for active sediment removal, based on a unit cost of $30 per CY.

		Percentage of total assumed actively removed			
Impoundment	**Total Impoundment Volume (CY)**	**10%**	**25%**	**50%**	**100%**
Lake George	73,900	$ 221,700	$ 554,250	$ 1,108,500	$ 2,217,000
Lake Louise	45,100	$ 135,000	$ 337,500	$ 675,000	$ 1,350,000

If the community wishes to dredge the impoundments for recreational use or to increase the water holding capacity of the dams, the same unit cost for dredging applies. Due to economies of scale, dredging costs may reduce with an increase in excavated volume. Total cost of such a dredging operation would depend on the amount of material desired to be excavated.

Summary

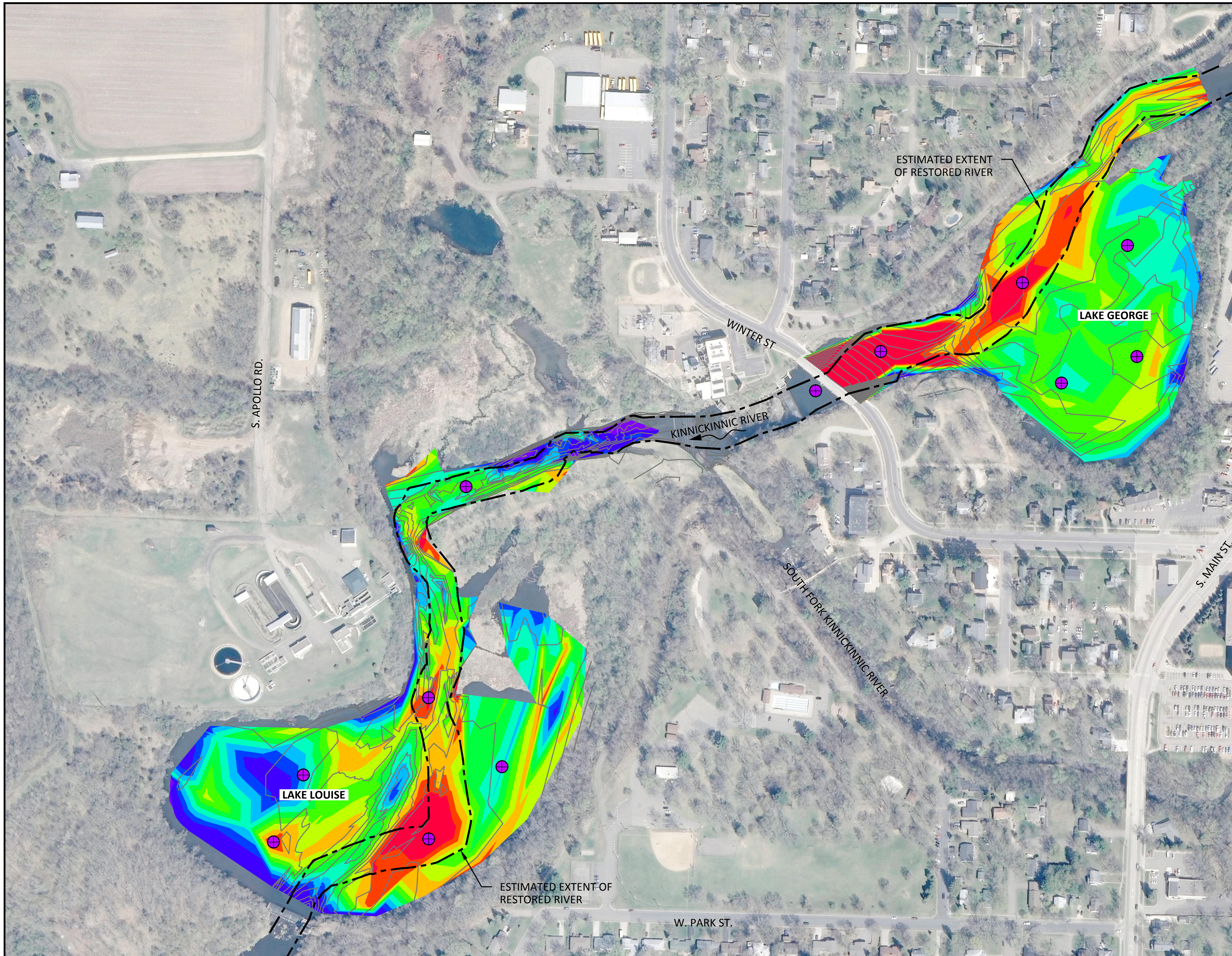
The sediments impounded within Lake George and Lake Louise area primarily fine to medium sands, with 20-40% silt, clay, and organics. The foreset bed or deltas at the upstream end of each impoundment are primarily medium to coarse sands Sediment samples were collected at representative locations along the existing main channel and along the off-channel areas within each impoundment (Figure 5), and the collected material was analyzed for physical characteristics, metals, PCBs, organochlorine pesticides, and PAHs (Table 2). The main channel sediments in Lake George were relatively uncontaminated, although concentrations of two PAH compounds exceed their respective TECs (Appendix B). In the off-channel, floodplain sediments of Lake George, concentrations of mercury, lead, arsenic, hexavalent chromium, total PCBs, and three PAH compounds exceed TECs or EPA screening levels in some of the sediment core samples. In Lake Louise, the downstream channel sediments (LL-C1 and LL-C2) were relatively uncontaminated. However, a high concentration of arsenic was present at LL-C1, exceeding the probable effect concentration (PEC). The cadmium concentration at LL-C1 exceeds the TEC. Arsenic concentrations exceed EPA screening levels for human health concerns at all three sites. At LL-C3, concentrations of 10 PAH-compounds exceed their respective TECs and PECs, suggesting that this is a site of contaminant concern. In the Lake Louise floodplain sediments, concentrations of mercury, nickel, arsenic, and hexavalent chromium exceed their respective TECs or EPA screening levels. In addition, concentrations of seven PAH compounds exceed their respective TECs, MECs, PECs, or EPA screening levels. PAH contamination in the upper portion of sample LL-F2 is of particular concern.

Sediment management options will include some combination of active and passive sediment management as described above, but the actual management scenarios used in each case will depend on regulatory guidance regarding management of contaminants and ecological impacts. The following next steps will be important tasks in developing refined costs for sediment management under any scenario, including dam removal.

Next Steps

- Review of contaminant data will be completed by the Wisconsin DNR to determine possible sediment management scenarios and the need for any further sampling and testing, if any.
- If dam removal is pursued, a dam removal feasibility study can be completed to build on the sediment volume and quality assessment. Concept designs would be included in the feasibility study, which will also include structural review, dam removal construction logistics, and sediment management and water routing options during construction.

Appendix A – River Falls Impoundment Sediment Quantity and Sample Locations (Kinnickinnic River, WI)



PLAN LEGEND

- EXISTING BED SURFACE 1' CONTOUR
- ESTIMATED EXTENT OF RESTORED RIVER
- PROPOSED SEDIMENT SAMPLING LOCATION

0 300 600

SCALE IN FEET

Sediment Depths Table

Number	Minimum Depth	Maximum Depth	Color
1	-12.00	-8.00	
2	-8.00	-6.00	
3	-6.00	-5.00	
4	-5.00	-4.00	
5	-4.00	-2.00	
6	-2.00	-1.00	
7	-1.00	0.00	
8	0.00	2.00	

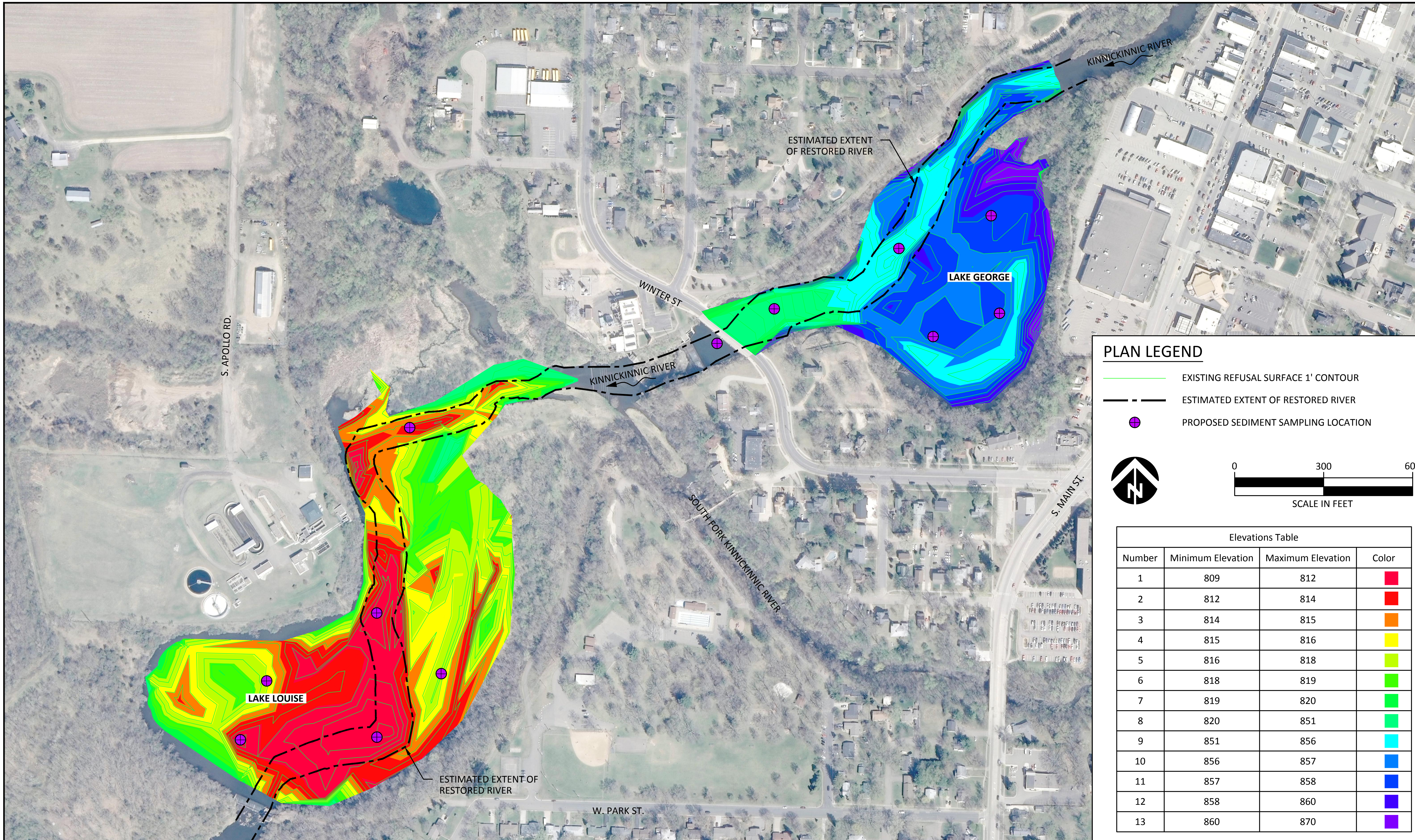
inter·fluve inc.

301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Sediment Depths

November 3, 2015



PLAN LEGEND

- EXISTING REFUSAL SURFACE 1' CONTOUR
- ESTIMATED EXTENT OF RESTORED RIVER
- PROPOSED SEDIMENT SAMPLING LOCATION

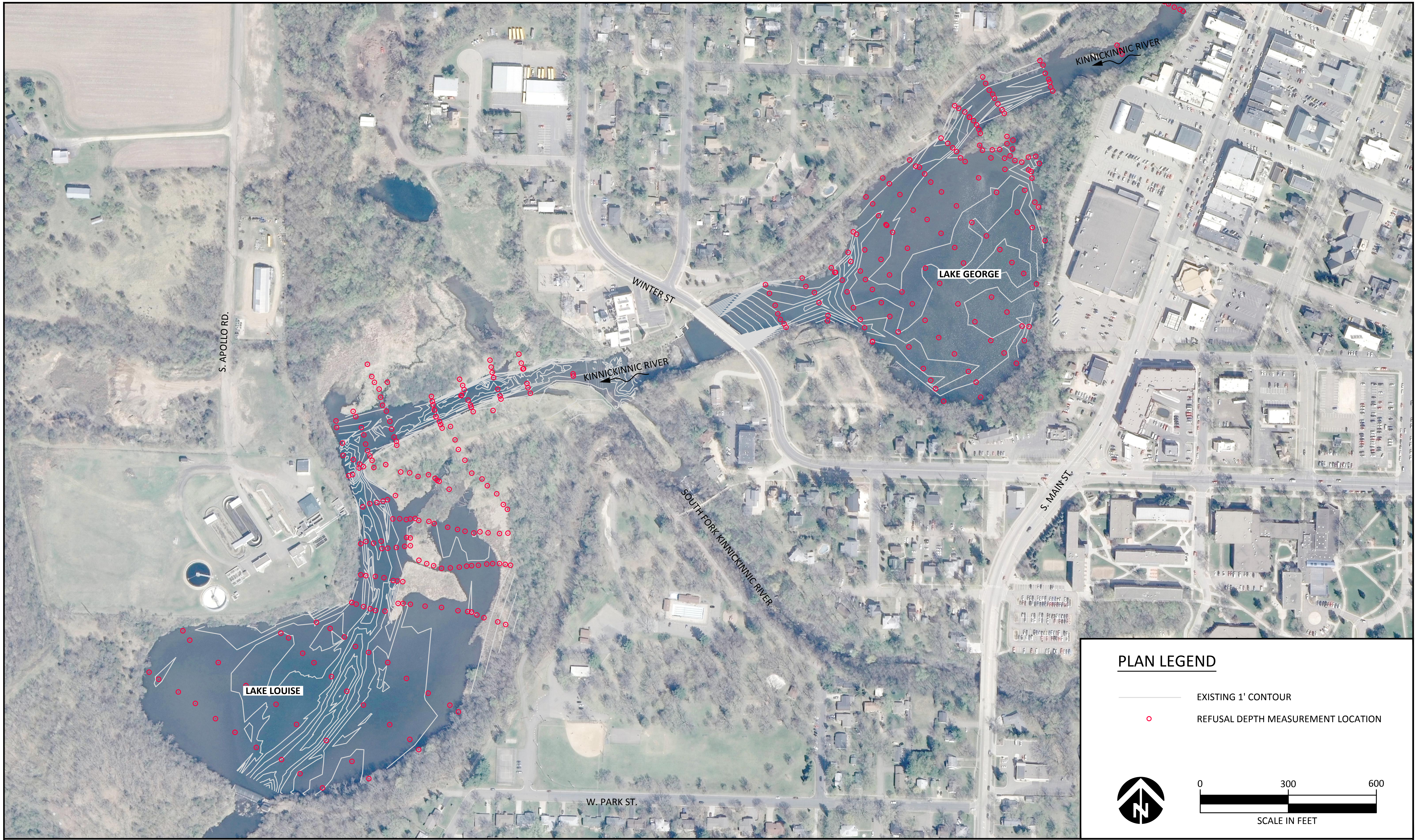
Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	809	812	
2	812	814	
3	814	815	
4	815	816	
5	816	818	
6	818	819	
7	819	820	
8	820	851	
9	851	856	
10	856	857	
11	857	858	
12	858	860	
13	860	870	

inter·fluve
301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Refusal Surface

November 3, 2015



301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Refusal Measurement Locations

November 4, 2015

inter·fluve inc.
301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Sample Locations

November 12, 2015

Appendix B – Inter-Fluve Sediment Sampling Plan

River Falls Dams

Final Sediment Sampling Plan

Submitted to:
Ray French
Management Analyst
City Hall
222 Lewis St.
River Falls, WI 54022

Prepared by:
Inter-Fluve Inc.

November 10th, 2015

Table of Contents

1. Introduction

The City of River Falls currently holds a license from the Federal Energy Regulatory Commission (FERC) to operate the hydroelectric facilities at the Junction Falls (Upper) and Powell Falls (Lower) Dams. The City recently completed an evaluation of the FERC relicensing process and is now pausing relicensing in order to fully evaluate alternatives and gather information to aid in the community decision process. To better understand the dam removal alternative and to fully assess risks associated with possible contamination in the existing impoundment sediment, the City of River Falls has contracted with Inter-Fluve to assess the quantity and character of the impounded sediment at both dams, and to determine the potential volume of sediment that may be evacuated or need to be excavated in the event of a dam removal.

In September 2015, Inter-Fluve staff surveyed the bathymetry and sediment depths in the impoundments at Junction Falls (Lake George) and Powell Falls (Lake Louise), and that information is presented here for review. This sediment sampling plan addresses contaminant testing and grain size analysis, both of which will aid in the development of a sediment management plan. A draft of the plan was submitted to the City and Wisconsin Department of Natural Resources (DNR). Following reviews by the City, the DNR and other residents, the draft plan was finalized in this document to be used as a basis for sampling.

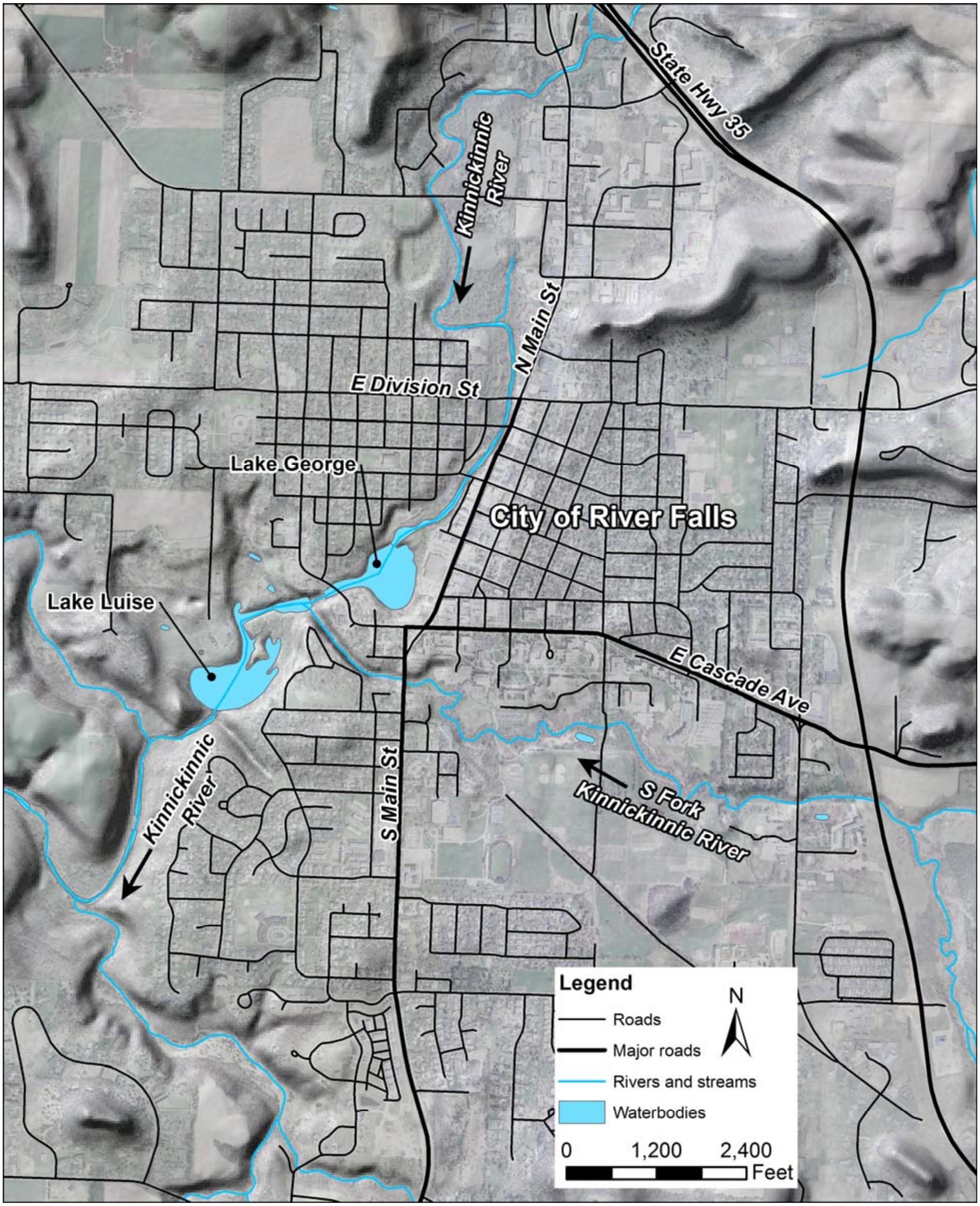


Figure 1. The Kinnickinnic River at River Falls showing the location of the two impoundments, Lake George and Lake Luise.

2. Due Diligence Summary

To determine the appropriate sediment quality testing regime, a due diligence review of potential contaminant sources was completed. Tables 2 and 3 below show a list of contaminants to be tested, and the standard tests to be performed.

We reviewed watershed land uses and potential point sources of contaminants such as large chemical users, historic spills, underground utilities and storage tanks. The Bureau for Remediation and Redevelopment Tracking System (BRRTS) is a searchable database containing information on the investigation and cleanup of potential and confirmed contamination to soil and groundwater in the State of Wisconsin. This search revealed 30 small incidents within River Falls that were addressed and closed. Additional closed sites were found throughout the watershed. Contaminants at the sites included unleaded gasoline, oil fertilizer, and VOCs. No major spills or incidents have occurred within the watershed.

No USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) or No Further Remedial Action Planned (NFRAP) sites were found. Of the 103 small waste quantity generator sites found under the Resource Conservation & Recovery Act of 1976 (RCRA), no major violations or outstanding corrections were found. There were no Superfund sites on National Priorities List (NPL).

The due diligence results indicate a likelihood of minor contamination typically found in urban areas, including heavy metals and hydrocarbons. Because we did not include an extensive review of historic landuse in River Falls, we have included a wide sweep using the Priority Pollutant Metals identified by the EPA. Polyaromatic hydrocarbons (PAHs) are ubiquitous in urban areas, and should be expected in some concentration.

The agricultural land use in the watershed suggests also testing for nutrients, nitrates, and in select areas, organochlorine pesticides and herbicides, including DDT, DDE and derivatives.

Although not commonly found in smaller urban watersheds, polychlorinated biphenyls (PCBs) can be found downstream of pre-Clean Water Act industrial sites, and have been identified as a concern of local residents. Potential PCB concentrations will be analyzed in the upper 6.0 inches of cores taken from areas that would become exposed floodplain following dam removal.

Past industrial uses in the watershed are varied. Because the analytes being examined cover a broad range of common contaminants, it is unlikely that further investigation into historical sources of contamination would be cost effective. Instead, we rely on the method of analysis and focus on the contaminants that we do find in the impoundments, if any are found.

3. Sediment Volume

3.1 METHODS

Field data collection consisted of bathymetric surveying and refusal depth probing. The bathymetric survey in Lake George involved manually surveying the channel and impoundment bed with a survey-grade rtkGPS unit. A series of 15 cross sections were surveyed to create an existing conditions surface of the bottom of the impoundment. Three additional cross sections were surveyed upstream of Lake George as sediment accumulation was evident up to the W. Maple St Bridge. At each survey location, we also measured sediment depth. This involved manually (by hand) driving a ½ inch diameter fiberglass rod into the sediment until a refusal layer was encountered. The type of material encountered at refusal was noted. Refusal material was determined by the abruptness of the rod stopping and the noise and vibration. Three classifications of material were delineated with this method based on validation at other sites: (1) cobble and larger rock, (2) gravels, and (3) sand or finer material. In locations where the pre-dam channel existed, cobble and larger rock was usually encountered at refusal. In locations that were likely floodplain areas prior to dam construction, a firm, compact layer (3) was encountered. The elevation of the refusal surface will be verified with vibracoring data during sediment sampling.

In Lake Louise, manual rtkGPS bathymetric and refusal data were collected as described for Lake George. In addition, the existing bathymetric data were supplemented with single beam sonar data to describe areas with deeper water. The sonar requires a minimum depth of three feet which was only present in the thalweg of Lake Louise. Extensive aquatic vegetation throughout the rest of Lake Louise and throughout most of Lake George prohibited further use of the sonar data.

Following field data collection, the survey data were integrated in AutoCAD® Civil3D® to create an existing conditions surface of the bottom of the impoundment and a pre-dam surface based on the refusal data. The data were adjusted using the National Geodetic Survey's Online Positioning User Service to relate the North American Vertical Datum of 1988 and the Wisconsin State Plane, Central (NAD83, US survey feet) coordinate system.

Boring data for the Winter St Bridge design were also incorporated into the digital surface models. This allowed us to extend the bathymetric and refusal surfaces in Lake George further downstream towards the dam.

Calculating the difference between the two surface models produced estimates of the total accumulated sediment volume in each impoundment. In Lake George, sediment accumulation in the three upstream cross sections was added by estimating sediment along cross sections and multiplying by reach length. We also estimated the expected volume of sediment to be mobilized if dam removal occurs. Based on reference reaches up- and downstream of the impoundments, a channel width of 55 feet was specified along the refusal surface thalweg alignment. From the edge of this expected channel, the surface was graded upwards at a 3:1 (horizontal:vertical) slope until the existing bathymetric surface was encountered. Because the impounded sediment encountered consists of highly mobile sand and finer fractions, we assume that the entire defined, post-removal channel volume will be mobilized downstream upon dam removal.

3.2 LAKE GEORGE

The total estimated volume of impounded sediment in Lake George was 149,000 cubic yards. This includes sediment between the Winter St Bridge and the E. Division St Bridge. The majority of sediments in Lake George are fine silts. As the impoundment narrows upstream of Lake George, the impounded sediments are primarily sand. Although the wetted width in this area suggests riverine conditions, there is little water surface gradient and sediments are easily deposited.

With dam removal, we expect about 58,500 cubic yards of sediment to transport downstream. It is unlikely that additional sediment would mobilize within Lake George as the east half of the impoundment refusal surface is perched relatively high compared with the thalweg along the west perimeter of the lake.

It should be noted that depth of refusal probing does not pick up all bedrock or other constraints, and is limited by point density. Any bedrock contacts, including the final waterfall crest elevation, may influence the total sediment volume. Thus, the sediment volume estimate may be conservative.

3.3 LAKE LOUISE

The total estimated volume of impounded sediment in Lake Louise was 162,000 cubic yards. Sediment grain sizes are predominantly silt but there is also more sand present than in Lake George. The more prevalent sand may be from the South Fork Kinnickinnic River that enters between the two dams. We also estimated about 58,000 cubic yards of sediment will mobilize with dam removal. The majority of this sediment is in the lower two thirds of the impoundment. In the upstream reach where the channel width is 150 ft or less, relatively little sediment is stored. Based on the presence of larger stones perched on the floodplain, it appears that this reach has been dredged in the past to deepen and straighten the channel upstream of the City's wastewater treatment plant.

It should be noted that depth of refusal probing does not pick up all bedrock or other constraints, and is limited by point density. Any bedrock contacts, including the final waterfall crest elevation, may influence the total sediment volume. Thus, the sediment volume estimate may be conservative.

4. Contaminant Sampling Plan

4.1 SEDIMENT AND POLLUTION EXPOSURE ROUTES

Sediment quality in both the mobile and immobile portions of the accumulated material is important, but the potential exposure routes are very different. The entire mobile portion of the sediment will eventually transport downstream unless it is excavated. During this transport, the material may be suspended in the water column or be transported along the channel bed during high flows while deposition would occur during low flows. Fish, macroinvertebrates and other wildlife as well as swimming, wading or boating humans may be exposed to this material and any associated pollutants. Further, pollutants that are associated with the material may end up in the food chain resulting in human exposure through ingestion. Due to these processes, the quality of the entire volume of sediment is important, and should be considered with respect to fish and wildlife as well as human incidental contact toxicity thresholds and bioaccumulation.

The immobile portion of the sediment would remain in place following dam removal and would likely be stabilized with vegetation. Though less accessible to most organisms than material that is transported in the river, there are several mechanisms for exposure to wildlife and people. Humans may come into contact with the top portion of the soil depending on proposed future land use of the newly exposed ground. Burrowing animals will come into contact with the top layers of the soil as well. Rainwater that infiltrates into these soils may pick up pollutants and carry them to the river where exposure routes would be similar to those for the mobile portion of the sediment. If the pollutant concentrations in these sediments may cause problems through any of these exposure routes, alternative sediment management methods may be warranted.

4.2 SAMPLE LOCATIONS AND METHODS

We propose collecting a total of twelve (12) impoundment sediment samples to be taken at the locations indicated in Figure 2. This includes three samples within expected mobile portions of sediment in each impoundment (6 total or 3 in each impoundment). These samples are concentrated in areas where accumulated sediment depths are greatest. Three additional samples in each proposed exposed floodplain area (6 total or 3 in each impoundment) will be tested to characterize the immobile portion of the accumulated sediment. These samples are distributed throughout the remainder of the impoundments. For each of the proposed floodplain sample locations, we will stratify the material into two sub-samples: an upper layer with the top 6 inches of sediment, and a lower layer with all sediment below 6 inches to the refusal surface. Samples will be taken to the approximate depth of refusal as measured in the initial sediment probing.

Shallow sediment samples less than 5 feet deep will be retrieved using a polycarbonate silt sampler, Wildco® hand corer with extension or other hand coring device. Samples taken in deeper sediments will be retrieved with a boat mounted vibratory core sampler, piston corer or Geoprobe® (to be completed by a geotechnical subconsultant). Sampling and lab sample processing procedures will follow Inter-Fluve's internal guidelines based on Wisconsin, Massachusetts and USEPA sediment sampling recommendations (Inter-Fluve, Inc., 2007; see appendix). Pollutants to be tested are listed in

The following details should be noted:

- PCB testing will be conducted only in the top 6 inches of the floodplain cores, and in both the upper and lower core samples near the waste water treatment facility outfall in Lake Louise.
- Organochlorine pesticide and herbicide testing will be conducted only in the upper and lower core samples near the waste water treatment facility outfall in Lake Louise.
- Thalweg cores will not be stratified.
- Control samples will not be tested unless deemed necessary following sample results.
- TCLP samples will not be sequestered or tested at this time.

Table 1. The laboratory chain of custody will be documented.

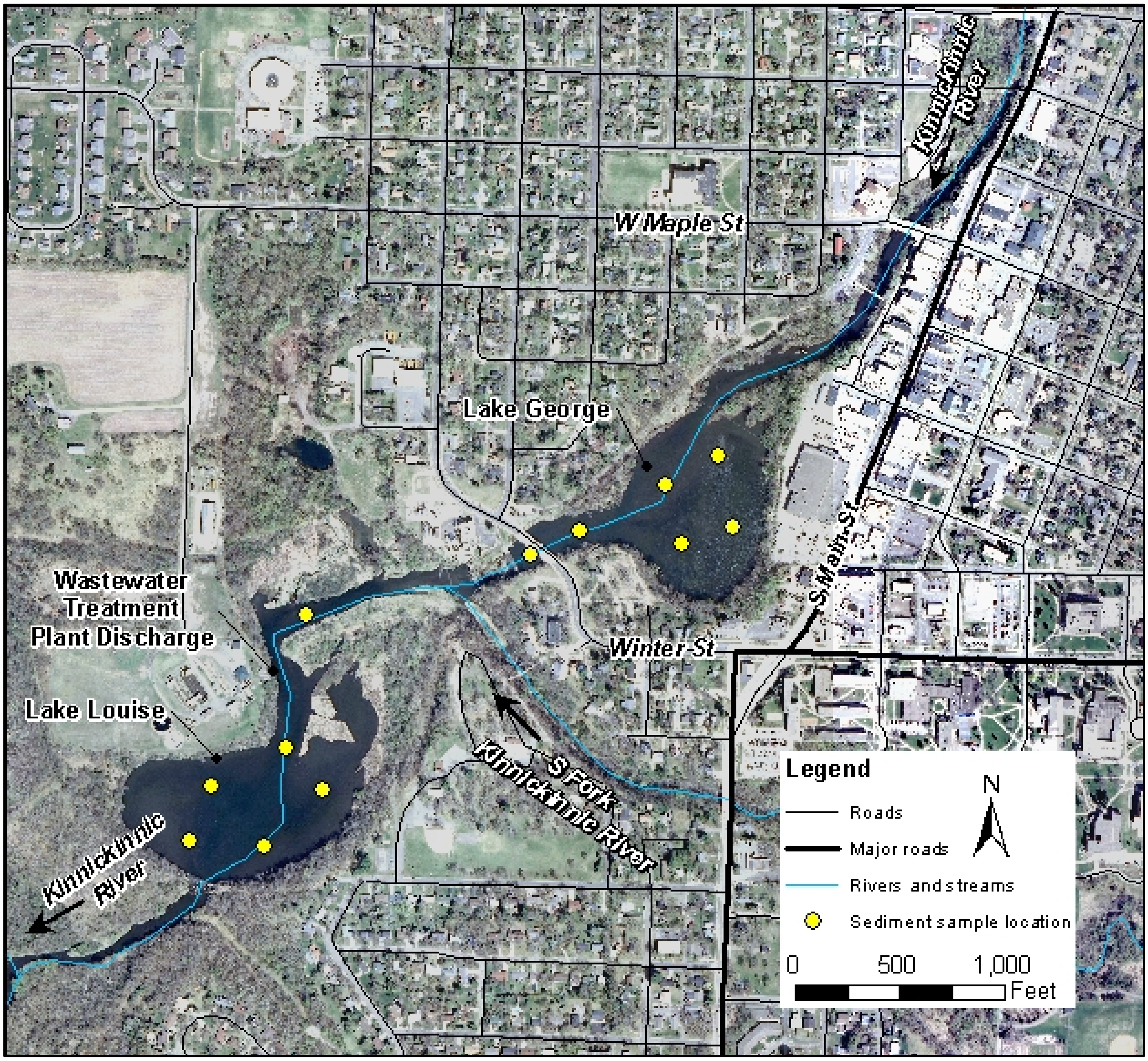


Figure 2. Proposed sediment sample locations (yellow points).

The following details should be noted:

- PCB testing will be conducted only in the top 6 inches of the floodplain cores, and in both the upper and lower core samples near the waste water treatment facility outfall in Lake Louise.

- Organochlorine pesticide and herbicide testing will be conducted only in the upper and lower core samples near the waste water treatment facility outfall in Lake Louise.
- Thalweg cores will not be stratified.
- Control samples will not be tested unless deemed necessary following sample results.
- TCLP samples will not be sequestered or tested at this time.

Table 1. Parameters to be analyzed – River Falls Dams.

Category	Specific Parameter
Metals	Arsenic, Cadmium, Chromium III/VI, Copper, Lead, Mercury, Nickel, Zinc
Organics	Polycyclic Aromatic Hydrocarbons (PAHs), Total Petroleum Hydrocarbons, Organochlorine pesticides and herbicides
Nutrients	Total Phosphorous, Nitrate, Nitrite, Ammonia, Total Kjeldahl Nitrogen (TKN)
Polychorinated Biphenyls (PCBs)	To be analyzed at the wastewater treatment plant discharge location only.
Physical	Total organic carbon, moisture percent, grain size distribution, bulk density
Other	Toxicity Characteristic Leaching Procedure (TCLP), to be completed pending the initial contaminant results.

Table 3. Analytical Standards to be used

Metals*	EPA 6010C/7471
Hexavalent Chromium	EPA 3060A/7196A
Trivalent Chromium	Calc
PAHs	EPA 8310
GRO	WDNR Mod
DRO	WDNR Mod
Pesticides	EPA 8081

Herbicides	EPA 8141
TOC	L-Kahn/9060A
% Moisture	SM2540G
Grain Size (NO Hydrometer)	ASTM C136-84A
PCBs	EPA 8082
TCLP Extraction (Zero Headspace)	EPA 1311
TCLP Extraction (Non-Zero Headspace)	EPA 1311

**CT Laboratories LLC (Baraboo, WI)*

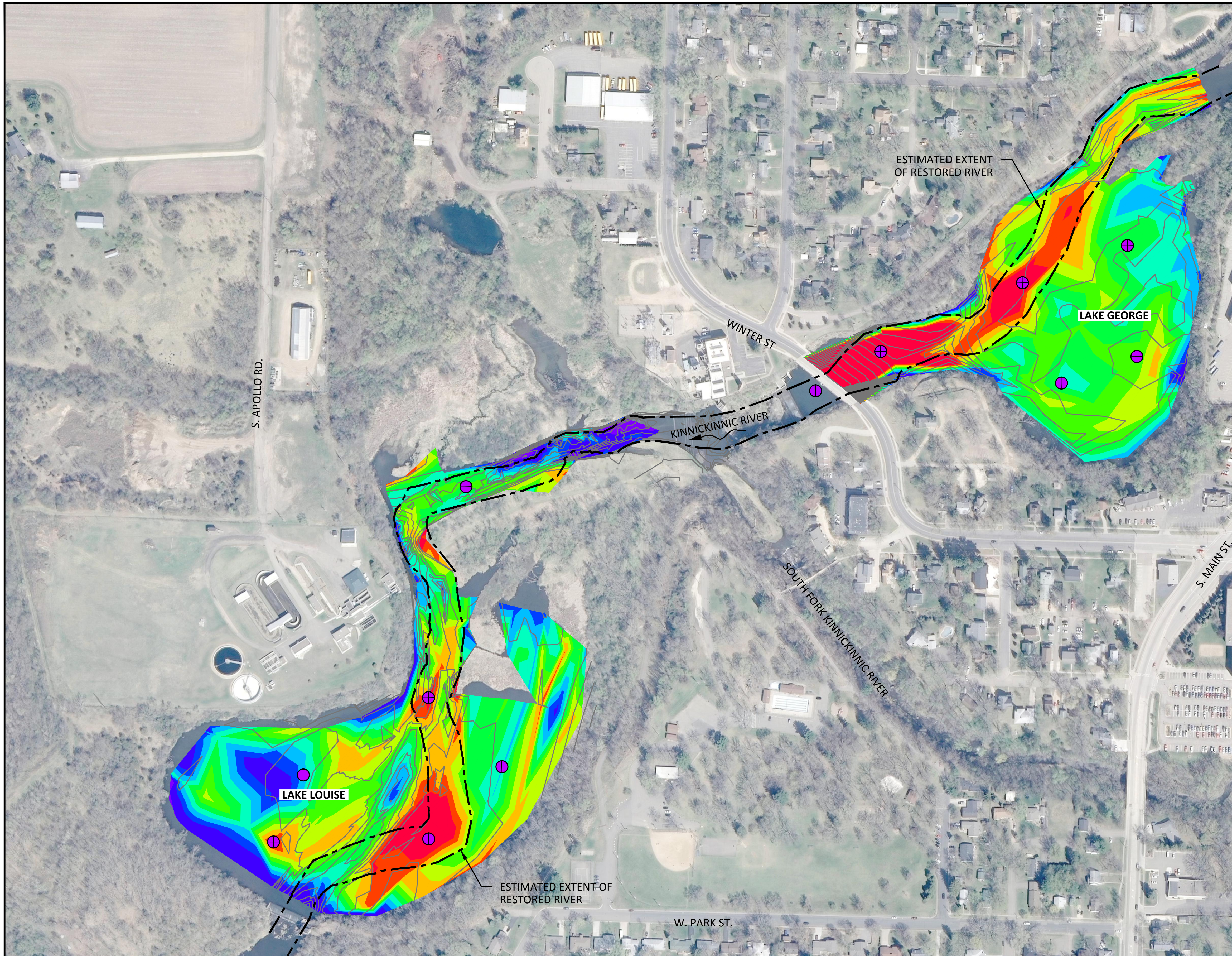
4.3 TOXICITY CHARACTERISTIC LEACHING PROCEDURES (TCLP)

TCLP testing assesses the ability of water to leach through sediment and into the groundwater. TCLP testing will only be performed for metals or organic compounds when the total concentrations in the sediment are above the theoretical levels at which the TCLP criteria may be exceeded. This will require further core sampling and laboratory analysis. For guidance, consult USEPA, Memorandum #316, "Notes on RCRA Methods and QA Activities," pp. 19-21, Gail Hanson, January 12, 1993.

5. References

Inter-Fluve, Inc. 2007. *Sediment Sampling for Dam Removal Projects – General Sample Collection Guidelines for Contaminant Testing*. Internal company protocol, Madison, WI.

Appendix A – Impoundment Sediment Depths and Proposed Sample Locations



PLAN LEGEND

- EXISTING BED SURFACE 1' CONTOUR
- ESTIMATED EXTENT OF RESTORED RIVER
- PROPOSED SEDIMENT SAMPLING LOCATION

0 300 600
SCALE IN FEET

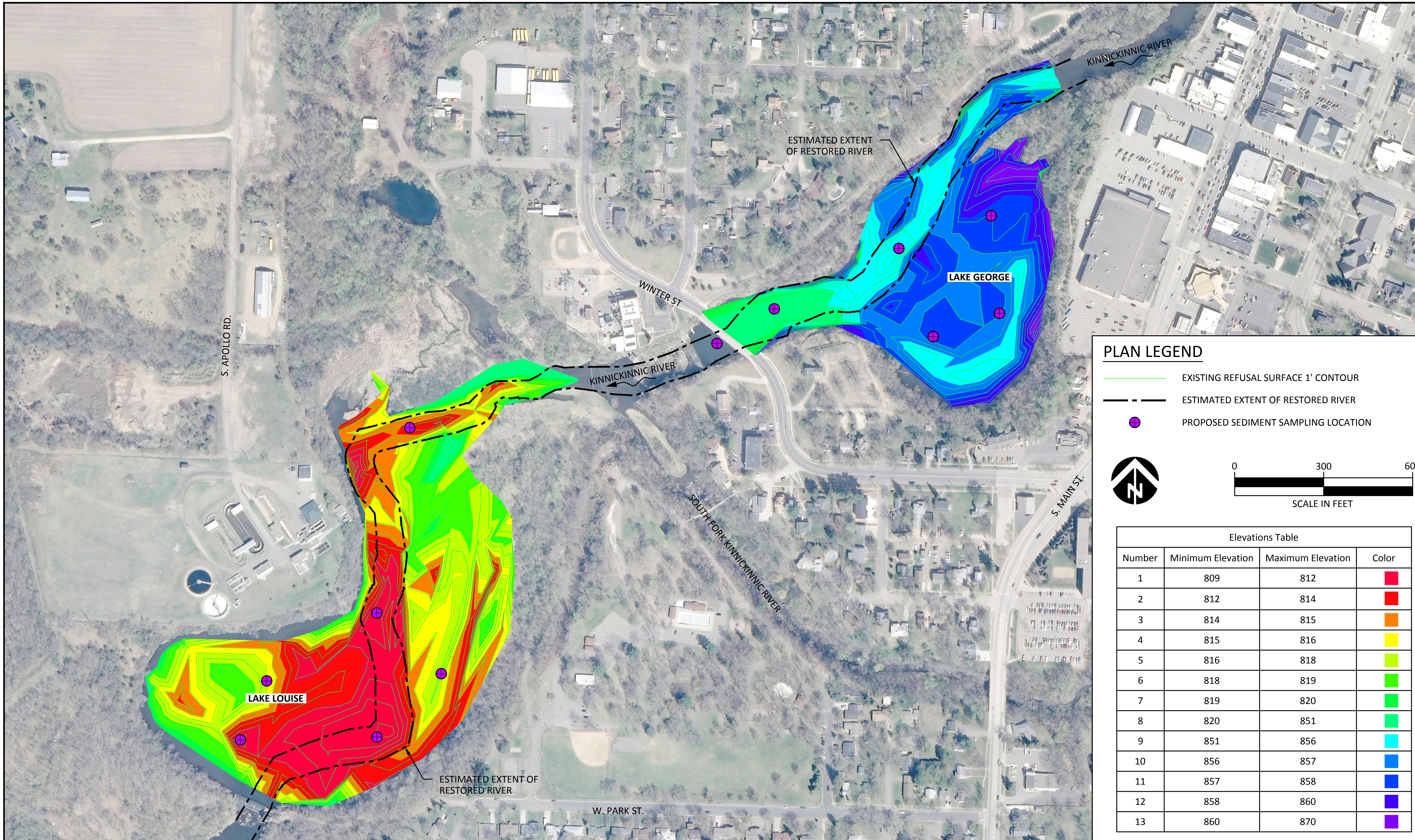
Sediment Depths Table			
Number	Minimum Depth	Maximum Depth	Color
1	-12.00	-8.00	Red
2	-8.00	-6.00	Orange
3	-6.00	-5.00	Yellow
4	-5.00	-4.00	Green
5	-4.00	-2.00	Light green
6	-2.00	-1.00	Light blue
7	-1.00	0.00	Blue
8	0.00	2.00	Purple

301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Sediment Depths

November 3, 2015



Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	809	812	
2	812	814	
3	814	815	
4	815	816	
5	816	818	
6	818	819	
7	819	820	
8	820	851	
9	851	856	
10	856	857	
11	857	858	
12	858	860	
13	860	870	

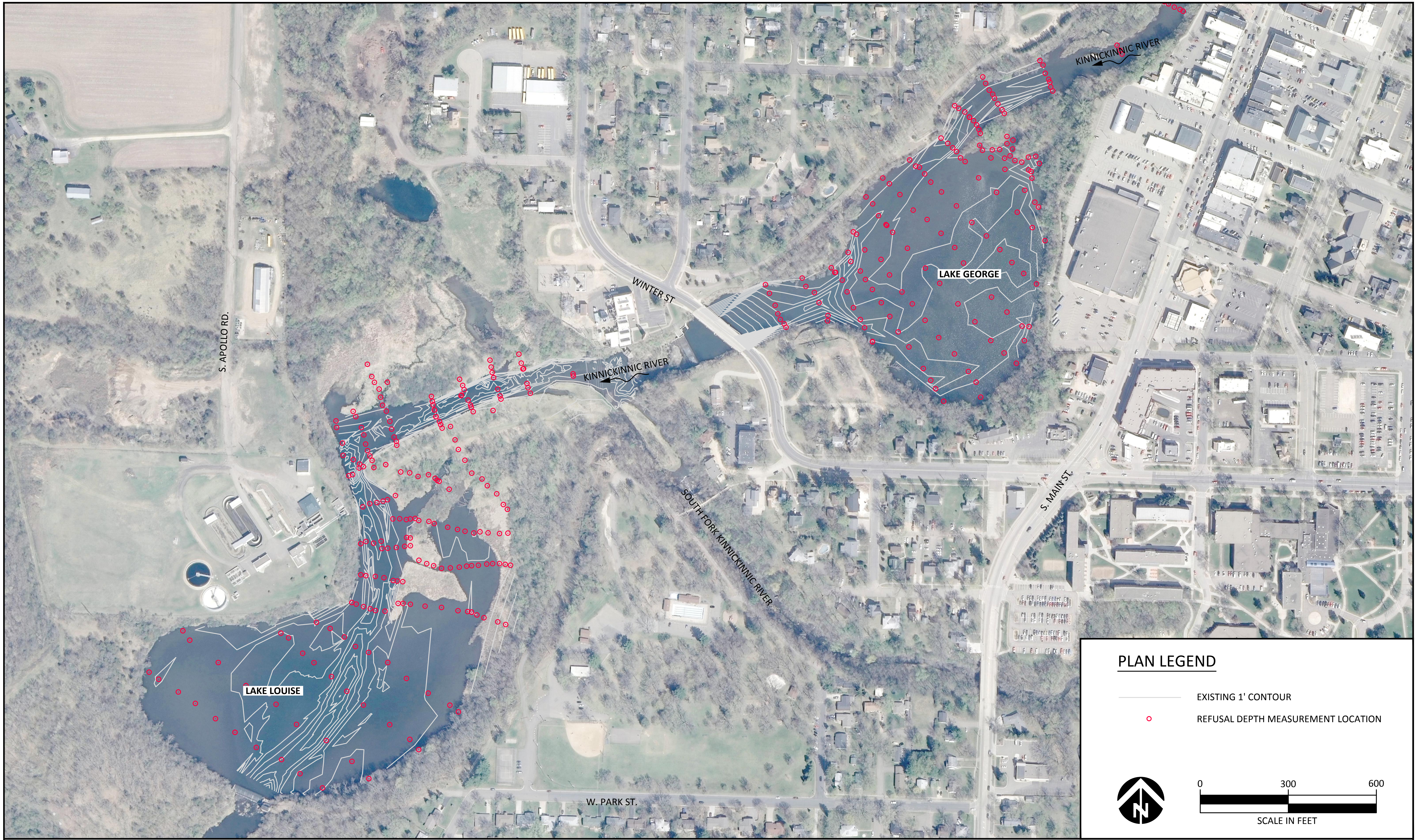
inter·fluve

301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Refusal Surface

November 3, 2015



inter·fluve inc.
301 S. Livingston St., Suite 200
Madison, WI 53703
608.441.0342
www.interfluve.com

River Falls Sediment Analysis

Refusal Measurement Locations

November 4, 2015

Appendix B – Inter-Fluve Sediment Sampling Protocol

Sediment Sampling for Dam Removal Pro ects

General sample collection guidelines for contaminant testing

April 25, 2007

inter·fluve, inc.

3602 Atwood Avenue
Suite 3
Madison, WI 53714
www.interfluve.com

This document is intended as a general guideline for sampling sediment deposited upstream of dams in relation to Inter-Fluve projects involving dam removal or modification, where testing of potential contaminants is required.

These guidelines are taken largely from the State of Wisconsin sampling guidelines and are generally in accordance with standard protocols as presented in US- EPA-823-B-01-002, 2001, *Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analysis: Technical Manual*. Refer to the EPA manual for a more detailed discussion of study plans, collection, and processing of samples. Individual projects and states may have specific requirements, and individual laboratories may have alternative instructions for data collection.

This document covers sampling procedures, and does not address sampling experimental design. For more detailed guidance in designing statistically robust sampling plans, consult the US EPA and the local state environmental agency.

Part 1 eneral Sediment Sampling Procedure

1. Scope

1.1. This section describes general procedures for sediment sampling and the use of common sediment sampling equipment. Study goals may require additional or alternate equipment or procedures other than those discussed herein. Any procedure changes should be based on sound scientific and practical reasons and should ultimately help further the goals of the study without the loss of quality assurance and control.

2. Equipment and Supplies

2.1. Below is a suggested list of equipment needed for most sediment sampling efforts. This list suggests equipment that may be necessary for your project and should not be considered exhaustive. Equipment that is specific to a specialized type of sampling may be included only in the section describing the particular type of sampling.

2.2. Equipment Checklist

- Boat, anchor, motor, gas tank, tow vehicle
- Life jackets
- Protective clothing: boots, waders, gloves, rain gear, etc.
- First aid kit
- Mobile phone
- Maps: road and site maps
- Compass and measuring equipment
- Electronic location device (Loran or GPS)
- Field notebook and field sheets
- Waterproof pens and pencils
- Field measurement equipment (temperature, dissolved oxygen, etc.)
- Sample containers
- Sample labeling tape or paper and permanent marker
- Sediment pole for measuring depth
- Coring device and dredge or grab with adequate rope and extension poles (grab is backup for corer in sandy sediments), including extension poles.
- Slide hammer for corer
- Pliers, wrenches, etc. for adjusting equipment
- Mixing bowl and spoon
- Cleaning (decontamination) supplies (non-ionic detergent, tub, brushes, etc.)
- Wash bottles
- Ice chest and ice for cooling samples
- Extra rope

2.3. Equipment suitability for chemical analysis:

2.3.1. All equipment or sample containers that will come into contact with a sediment sample for chemical analysis should be constructed of materials that will not affect the concentration of contaminants in the sediment sample. In general, sediment samples to be analyzed for metals should not touch metallic surfaces (other than stainless steel), and samples for organic analysis should not contact materials that can react with organic substances. The level of care that needs to be taken with the materials used will depend on the level and types of contaminants associated with the sediment and the quality assurance needs and study goals.

2.3.2. For **organic analysis**, equipment and containers should be constructed of: *glass, teflon, polycarbonate, nylon, aluminum, galvanized steel, stainless steel or porcelain*. *Acrylic* core tubes are also acceptable for almost all sampling needs.

2.3.3. For **inorganic analysis**, equipment and sample containers should be constructed of: *glass, teflon, polyethylene polycarbonate*, *stainless steel* or *acrylic*.

3. Basic Sediment Sampling Procedures

3.1. Preparation

3.1.1. Sampling Plan - Sampling strategy decisions and sampling locations should be made well before going into the field, and should be designed to collect quality data that will best answer the questions or meet the goals of the study or monitoring program. Reconnaissance level or statistically robust screening level plans should be in place prior to field work. Decisions should be made ahead of time about sample location, number of replicates at each site (sampling strategy), and what chemical analyses to be performed on the samples. This will help ensure that appropriate and quality samples are collected.

3.1.2. Safety - All field staff should be aware of and fully understand the possible physical and chemical safety hazards posed by any site. Precautions should be taken to prevent exposure to contaminated sediments.

3.1.3. Equipment - Make all the preparations necessary to obtain suitable collecting equipment, protective clothing, vehicle and boat. Test and calibrate any equipment according to manufacturer's instructions. Record in the field notebook information about the instrument tests and calibrations including: dates, results and person testing the equipment. It may help to label sample containers for each site prior to sampling.

3.1.4. Cleaning Equipment - All equipment should be cleaned *before going into the field and between sites and samples* to prevent contaminating sediment samples. Equipment should be washed with clean scrub brushes using a non-phosphate detergent that leaves no residue when rinsed such as Alconox powdered or Liqui-nox liquid detergent (Liqui-nox is the EPA standard detergent for sampling apparatus). To properly clean equipment, wash apparatus thoroughly with detergent, then rinse 5-6 times with tap water and 3 times with deionized/distilled water if available. Rinse the apparatus with site water before taking the first sediment sample.

3.1.5. Field Observations **-** Take turbidity or Secchi readings first if possible, before the sediment is suspended by other sampling procedures. Record all field measurements and observations.

3.2. General Procedures in the Field

3.2.1. Turn on any equipment that needs to warm up (like a DO meter) first or before reaching the site.

3.2.2. Make sure all equipment is clean and ready to use.

3.2.3. When working from a boat, two or three anchors or spuds driven into the sediment in shallow water will help stabilize boat in breezy, open water conditions.

3.2.4. Each grab or core attempt, whether for a composite sample or replicates, should be <u>taken from undisturbed sediment</u> at the site. Avoid disturbing sediments with a boat motor or by walking on the site. Approach sites from downstream to avoid suspending sediment into the water column over the site.

3.2.5. Have container ready to accept entire sample quickly upon retrieval.

3.2.6. Label every sample container with a permanent marker on labeling tape on the side of the jar or wherever the label will not come off accidentally. Information on the label should include: **Sample #, replicate #, date, collector name** and **analysis type** (organic, inorganic).

3.2.7. Record all site information in a field notebook or on fieldsheets before leaving site. Information usually includes: field measurements, time and date, persons collecting samples, number and types of samples taken including field blanks, etc., labels assigned to each sample, and any general observations. Keep records of all samples, how they were labeled and any blanks or controls that are submitted for analysis.

3.3. Collecting Composite Samples

3.3.1. Composite samples are generally used to estimate the average concentration of the individual samples that make up the composite. Multiple grabs or cores for a composite sample should be taken from a relatively homogeneous sediment deposit (i.e., all grabs should be of similar sand/silt content). In some cases, composite samples are needed to generate sufficient sample volume for all analyses. It is best to know the rough boundaries of the sediment deposit or "site" before sampling.

3.3.2. Place each grab or core into a single mixing bowl (made of suitable material), remove any large objects such as sticks, leaves or stones, etc. and stir thoroughly with a spoon to homogenize. A single grab or core should be mixed at least two minutes. Multiple grab or core samples should be mixed five minutes or longer if necessary.

3.3.3. Fill sample jars with the sediment mixture by placing one spoonful sequentially into each jar until the jars are full (see section on sample containers). This sub-sampling system assures that each sample container contains a sample as similar as possible to the other containers.

3.4. Collecting Replicate Samples

3.4.1. Replicate samples can be obtained at different stages of the sampling for different purposes depending on the objectives of the study. A study plan should describe where and how much replication is necessary. The procedures described here are for collecting distinct field replicate samples where the object is to determine the variability within a deposit and compare one field site to another.

3.4.2. When collecting replicate samples to statistically compare sediment deposits, sample sites within each deposit should be randomly located for statistical comparisons to be valid.

3.4.3. Be sure each sample is taken from an undisturbed area of sediment

3.4.4. If the replicate samples are fairly similar, the equipment need only be rinsed with site water between samples. But, if the replicates are not similar, and some contain significantly more fines than others, than the core tube or dredge may need to be washed with a non-ionic detergent (see equipment) and rinsed in between samples to prevent cross-contamination and to keep replicate samples independent for valid statistical analysis of the data. Use a tub of water in the boat to wash equipment to prevent getting detergent in the site water while sampling.

4. Procedures for Core and Grab Sampling Devices

4.1. Sediment samples are most commonly collected using a coring device, dredge or grab sampler. The type of collecting equipment chosen will depend on sediment texture, site location (depth and current velocity), analyses to be performed and study goals. See **References** for more detailed discussion of the pros and cons of various sampling devices.

4.2. Piston Corer

4.2.1. Preparation and Scope

4.2.1.1. A corer allows excellent quantitative and qualitative sampling to a specified sediment depth with little disturbance of the sediment water interface. Samples can be separated or stratified by depth or color/texture to analyze distinct layers of sediment, although the sediment along the side of the core may smear as the core penetrates, slightly distorting the stratification of the sediment.

4.2.1.2. A corer may not be able to penetrate and/or retain very sandy substrates. Coring in high clay-content sediments where grabs won't work is possible if the water is not too deep, but may be difficult with a push corer and may require the use of a slide hammer or vibrating corer.

4.2.1.3. A large bore corer will provide a larger volume of sediment per attempt. This is important if discreet sample replicates are desired, and enough sample must be collected for a specific analysis or test. Even with the large bore core tube, samples may need to be combined to obtain enough sediment volume for the required analyses and/or tests.

4.2.1.4. A hand-operated, 3 inch diameter core sampler with an optional piston and extensions for deeper water can be effectively used in soft sediments with some silt/clay content in water up to ~30 ft deep. Core samplers may not be able to penetrate or retain very sandy sediments.

4.2.2. Collection Procedure

4.2.2.1. This procedure can be used for a push corer with or without a piston. A piston may not be necessary in high clay sediments. Disregard directions for use of the piston if piston will not be used.

4.2.2.2. Assemble the corer. Adjust the piston (the nut on the bottom adjusts piston diameter) so that it fits snugly. If the piston is too loose, it will not stay in place until the corer reaches the sediment. If too tight, the piston will not move sufficiently when the corer is being pushed into the sediment, and compaction of the sediment core may occur.

4.2.2.3. Position the piston at the bottom of the core tube (open end), with the rope attached and threaded through the core head.

4.2.2.4. With the piston in place, let the core tube fill with water from the top, then lower the corer slowly and vertically to the sediment. If the piston falls out the bottom or moves up the core tube before reaching the sediment, tighten piston slightly and try again.

4.2.2.5. With the bottom edge of the corer and the piston in contact with the sediment in a vertical position, push the core tube into the sediment while maintaining some tension on the piston rope. The piston should remain at the sediment surface while the core tube moves into the sediment. In difficult sediments, it may be necessary to actually pull on the rope as the corer is pushed into the sediment. The object however is to maintain the piston in a fixed position at the sediment-water interface without compacting the sediment.

4.2.2.6. In hard or clay sediments where it is difficult to push the corer into the sediment by hand, a slide hammer designed specifically for the core sampler should be used. Do not pound on the core head or extension tubes with a hammer or anything else as this could break or damage the core head or other parts, and is generally less effective than the slide hammer.

4.2.2.7. After core is pushed to desired depth, pull up the corer slowly while maintaining the position of the piston by holding the piston rope in place. Even with the piston, some sediment may be lost from the bottom of the corer if the sediment is sandy. To help prevent sample loss, bring the corer into a horizontal position as it reaches the surface. A plug can also be inserted into the bottom of the sampler before removal from the water.

4.2.2.8. Place the corer on the work surface (boat or ice) over the receiving container. The sediment core can be extruded from the top or bottom of the core tube, depending on the purpose of the sample and study goals. Generally, cores collected for macroinvertebrate work should be extruded out the bottom, and cores collected for chemical analysis should be extruded out the top of the core tube if only part of the segment is needed to reduce contamination of the sample segment from other layers.

4.2.2.9. To extrude through the bottom, remove the sampler head, insert a pole through the top and push down on the piston eyebolt. Extrude the core into a waste container until the desired length of core remains, then extrude the remaining sediment into the sample container. To extrude through the top, remove the sampler head and place an extrusion pole and rubber plug at the bottom of the sampler and push sediment out through the top slowly. A premarked acrylic or polycarbonate (clear) core tube is helpful for measuring core lengths.

4.3. Grab Samplers

4.3.1. Preparation and Scope

4.3.1.1. Grab samplers rely on their own weight and gravity to penetrate the sediment as well as the leverage from the closing of the jaws. For this reason, they are not as efficient in water flowing over one meter per second. They normally take a discreet "bite" of sediment to a fairly consistent and measurable depth. Grabs often cause a shock wave upon descent which may disturb very fine sediment at the sediment-water interface.

4.3.1.2. Many grabs and dredges such as the petite Ponar and Ekman dredge can be used. These two can be hand operated from a suitably sized boat, preferably flat-bottomed. The Ponar is better suited to sampling hard or sandy sediments because of the greater ability to penetrate. The Ekman is more suited to sampling in soft sediments in low flow waters. Neither grab will effectively sample hard clays where a coring device or shovel such as a sharpshooter spade can be used.

4.3.1.3. Have a sample tub ready to receive sediment that is large enough to receive the entire contents of the sampler.

4.3.1.4. Understand and be careful of the closing mechanism and moving parts on a sampler.

4.3.2. Collection Procedure

4.3.2.1. Set closing mechanism and lower grab slowly to substrate, being careful to avoid a shock wave caused by too rapid of a descent near the sediment.

4.3.2.2. Initiate closure mechanism of grab. This is usually a messenger sent down the rope or a sharp pull on the rope.

4.3.2.3. When it feels like the grab has closed and contains sediment, raise grab at a steady rate and immediately position over large bucket. If jaws are not completely closed due to obstructions, discard entire grab contents away from sampling area and try again.

Make sure to move the sampling site at least several feet away from the previous attempt(s) to avoid sampling a disturbed area.

4.3.2.4. If the study dictates careful sampling for metals analysis, the middle portion of the sample not touching the metal grab can be collected with a teflon or plastic spoon, and the rest of the sample discarded.

4.3.2.5. Empty entire contents of grab into mixing bowl if sample needs to be mixed.

4.3.2.6. Place appropriate volume of sediment into sample container.

4.3.3. Quality Control Measures

4.3.3.1. Sediment samples should be collected from the reference or control sites first when possible to reduce the chances of cross-contamination from other sites.

4.3.3.2. All samples in a study should be handled identically, including using the same sampling equipment, stirring times, etc.

4.3.3.3. When collecting samples for chemical or toxicity tests, take appropriate measures to prevent contamination from other sources such as vehicle and boat motor exhaust or associated contaminants and other contaminated sites. The person operating the boat motor should either not handle sediment samples or make sure to put on clean gloves to prevent contamination from the motor.

5. References

Baudo, R., Giesy, J., and H. Muntau, (Eds.). 1990. *Sediments: Chemistry and Toxicity of In-Place Pollutants*. Lewis Publishers, Boca Raton, FL.

EPA. 1992. Sediment classification methods compendium. Office of Water, Washington, DC. EPA 823-R-92-006.

EPA. 1985. Sediment sampling quality assurance user's guide. Environmental Monitoring Systems Laboratory. Las Vegas, Nevada. EPA/600/4-85/048.

EPA. 1994. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.

Green, Roger H. 1979. Sampling design and statistical methods for environmental biologists. John Wiley & Sons. New York. 257 pp.

Klemm, D.J., P.A. Lewis, F. Fulk, and J.M. Lazorchak. 1990. Macroinvertebrate field and laboratory methods for evaluating the biological integrity of surface waters. Environmental Monitoring Systems Laboratory, U.S. Environmental Protection Agency, Cincinnati, OH 45268. EPA/600/4-90/030.

WDNR. 1990 (draft). Quality Assurance Guidance for Inplace Pollutant Monitoring Activities. Unpublished document on file at Office of Technical Services, Bureau of Water Resources Management.

Part 2 Collecting and Processing Samples for Chemical and Physical Analysis

1. Scope

1.1. Quality data can only be obtained from environmental samples that are properly collected, preserved and promptly shipped to the laboratory for analysis. The procedures involved in this process include: 1) collecting the samples using appropriate sampling techniques; 2) selecting proper sample containers; 3) preserving the samples immediately after collection either chemically or by cooling to 4°C, whichever is appropriate; 4) clearly identifying the samples and completing the corresponding laboratory sheets; and 5) carefully packaging and promptly shipping the samples to the laboratory for analysis.

1.2. Sediments for organic and inorganic chemical analyses are most often collected using grab, dredge or core methods. The chosen method should target the goals of the study plan and complement any other biological tests that may be conducted at the site or with sediments from the site. Samples slated for different types of physical and chemical analysis may need to be collected and handled in slightly different ways. The level of precautions that must be taken to prevent contamination of samples will depend on the type of analysis to be performed and the study objectives.

2. Equipment

2.1. Sample Containers - Samples for organic analysis and inorganic (metals) analysis must be in separate containers. Containers are prepared by and should be obtained from the laboratory doing the analyses. General guidelines are as follows:

2.2. Sample Containers for Inorganic Analysis

2.2.1. Sediment samples should be submitted to the laboratory in a container appropriate for the analyses requested.

2.2.2. Metals - Samples that require metals analyses should be submitted either in 250 mL "metals" bottles or a glass quart mason jar with teflon lid. One 250 mL "metals" bottle (same as for water) provides enough sample to perform all of the routine metals analyses and solids analyses.

2.2.3. Nutrients - Samples that require nitrogen, phosphorus and solids analyses should be submitted in 250 mL "nutrient" bottles or a glass quart mason jar with teflon lid.

2.2.4. Oil & Grease - Samples for Oil & Grease are analyzed by the inorganic section and must be in a glass quart jar with a teflon lined lid. Fill jar 3/4 full or more. Separate containers for metals or nutrients are not necessary if the glass quart jar is used.

2.2.5. Additional information can be obtained from:

East Coast

Tim Byrne
GeoLabs, Inc.
Sales Director/
Environmental Scientist
45 Johnson Lane
Braintree, MA 02184
P 1-781-848-7844
F 1-781-848-7811
C 1-781-420-1178

2.3. Sample Containers for Organic Analysis

2.3.1. Soil and sediment samples should be submitted to the laboratory in a container appropriate for the analyses requested.

2.3.2. Organics (PCBs, PAHs, etc.) - Samples for all regular organics analysis should be contained in glass quart jars with teflon lined lids. Jars should be 3/4 full or more. If analyzing for semi- or volatile organics fill jar completely so no air space exists.

2.3.3. Volatile Organic Carbon (VOC) and Gasoline Range Organics (GRO) - A 60 milliliter glass vial with a septum top should be used for soil and sediment samples that are to be analyzed for VOC and GRO. The laboratory will provide three pre-weighed sample vials for each sample site. The vials should be filled with sediment to the "Fill to here---" label (approx. 25g) found on the side of each vial. A water and methanol "trip blank" will be included in each sample mailer.

2.3.4. Diesel Range Organics (DRO) - A 60 milliliter glass vial should be used for soil samples that are to be analyzed for DRO. The laboratory will provide three preweighed sample vials for each sample site. The vials should be filled with soil to the "Fill to here---" label (approx. 25g) found on the side of each vial.

2.4. Samples for Bioassays and Chemical and Physical analyses

2.4.1. If chemical and/or physical analyses are required on sediment samples also slated for toxicity or bioaccumulation tests, the lab can perform the sediment homogenization and fill sample jars for the chemical analyses from the same sediment that will be used for the bioassays. The testing lab should be contacted for information on appropriate sample containers and procedures.

2.5. Samples for Particle size analysis

2.5.1. Quart-size plastic bags (from the store) can be used for particle size samples. **Double bag** the sample and fill 1/2-3/4 full. Label **both** bags in permanent marker with Sample #, date and collector's name. Particle size analysis is usually contracted for every chemical analysis sample, but be sure to clarify this testing with the lab and collect sediment for this analysis.

2.6. Quality Control of Sample Containers

2.6.1. Quality control audits should be conducted for chemical analysis to verify that they are free from contaminants. These audits are performed before any bottles are approved for use. Because of the considerable effort expended in assuring the quality of sample bottles, it is important that they be used only for the parameters specified on the label.

2.6.2. To make sure appropriate procedures are used to prevent contamination, quality control information should be obtained from analysis laboratories when the contract for service is generated.

3. Cleaning Sediment Collection Equipment

3.1. The following steps for cleaning new or used sediment sampling equipment and containers are recommended by EPA (1994):

3.1.1. Soak 15 min in tap water, and scrub with detergent.

3.1.2. Rinse twice with tap water.

3.1.3. Rinse once with fresh, dilute (10% V:V) hydrochloric or nitric acid. To prepare a 10% solution of acid, add 10 ml of concentrated acid to 90 ml of deionized water.

3.1.4. Rinse twice with deionized water.

3.1.5. Rinse once with full-strength, pesticide-grade acetone (use a fume hood or canopy).

3.1.6. Rinse three times with deionized water.

3.1.7. Rinse field collection equipment with site water immediately before use. Lab equipment should be rinsed with test dilution water immediately before use in a test.

3.1.8. Clean equipment can be protected from contamination during transport (i.e., exhaust, pickup beds, boat motors, etc.) by wrapping in aluminum foil.

3.1.9. Quality control procedures to be followed at the sites should be written down for all field staff.

4. Sample Preservation

4.1. All sediment samples for chemical analysis should be preserved as soon as possible after collection by cooling to and **maintaining** a temperature of ~4°C (ice cold) by putting samples on ice in a cooler.

4.2. Keep samples shaded from sunlight to prevent breakdown of chemicals by UV light.

4.3. Ice packs should be included in each sample kit designed for VOC, GRO and DRO analysis, although samples should first be cooled to 4°C on ice. Plastic bottles can also be filled with water, frozen, and placed in the shipping container. Samples should be pre-chilled if these cooling materials are used for shipping.

4.4. For soil or sediment samples to be analyzed for GRO, it may be required to add 25 ml of premeasured methanol to two of the sample vials at the time of collection. (Vials of methanol should be provided by the lab) A third vial is used for determining moisture of the sample.

4.5. For soil samples to be analyzed for VOCs, the collector should consult the laboratory and the individual program needs for the appropriate preservation requirements which may include methanol preservation.

4.6. Contact the contracted laboratory for additional preservative requirements for specific parameter requests.

5. Packaging and Shipping

5.1. Cooling Samples

5.1.1. When cooling is required during shipping, the samples should be pre-cooled in an ice chest, and later placed in a field pack with a suitable quantity of ice or "Blue Ice". Ice should not be placed in the field pack loose. It should be securely sealed in a heavy plastic bag to prevent leakage during shipment. DO NOT USE metals bottles, nutrient bottles, or bottles designated for specific tests as ice containers.

5.2. Packing Samples

5.2.1. Properly packaging sediment samples for shipping is important for maintaining sample quality and safety of persons contacting the samples.

5.2.2. After collection, check each sample to make sure the container lid is securely closed and the sample is properly preserved. The exterior of each sample container should be wiped clean with a wet cloth.

5.2.3. Check all samples for secure, correct and complete labels that match the accompanying lab sheets (see below).

5.2.4. A whirl-pak or ziploc plastic bag should be used to protect the laboratory sheets from moisture damage during shipment. Dividers, included in the packs, help protect the sample bottles during shipment and should be used whenever possible. When sealing the field packs, secure all four sides of the lid by wrapping with reinforced tape. The tape should be completely wrapped around the pack to make sure that the lid is secure. When more than one field pack is needed to ship various sample portions from a single sampling site, tape the field packs together. This will prevent sample sorting errors and will allow the lab to match the bottles with the correct laboratory sheets.

5.2.5. A cooler lined with a polyethylene bag can be used instead of the foam pack if necessary, but be sure to pack sample jars to avoid breakage during shipping and handling.

5.3. Laboratory Sheets

5.3.1. Different laboratories may have their own lab sheets that should accompany all samples. Generally, lab sheets should include:

- Sample identification
- Sample description
- Sampling program
- Name and address of the person to whom the report should be sent
- Last name of the sample collector
- Field information
- Tests (parameters) requested

5.3.2. The laboratory sheet is an important link between the laboratory and field personnel. The laboratory relies on the sheet to obtain the information necessary to prepare and analyze the sample properly.

5.4. Shipping Samples

5.4.1. If storage time limitations are recommended for the sample parameters, coordinate with the laboratory before collecting samples to let them know the sampling schedule.

5.4.2. Alert the receiving laboratory of any samples that are known or believed to contain high levels of specific contaminants, including an estimated concentration if possible. This can be done either over the phone before the samples arrive or with an enclosed written warning. The advanced notice allows the lab to handle highly contaminated samples in a way to prevent human exposure as well as cross-contamination of samples in the lab. Additionally, the lab will be able to process and analyze the samples more quickly if they know before analysis that the contaminant concentration is high.

5.4.3. Samples should be shipped with an "overnight" mail service or personally delivered to the laboratory for temporary storage so that the samples arrive before all of the ice melts in the shipping container. Monday, Tuesday or Wednesday are the best days to ship samples to assure they do not sit in a mail room with no refrigeration over the weekend. Even "overnight mail" can take longer than 24 hours, so Thursdays can be risky. DO NOT send samples on Fridays unless you have made previous arrangements with the lab.

5.5. Shipping Safety

5.5.1. If a sample bottle seal is questionable and no additional bottles are available, place the entire bottle in a whirl-pak (250 mL bottles only). This will contain the sample and prevent any preservative from contaminating other samples in the field pack.

5.5.2. The outside of the sample containers should be completely free of contaminated material before the samples are shipped. If this is not possible, the laboratory should be made aware of these samples before shipment.

5.5.3. If the submitter believes a sample contains a Department of Transportation (DOT) regulated material or hazardous material, refer to individual state shipping guidelines for hazardous materials.

6. References

Baudo, R., Giesy, J., and H. Muntau, (Eds.). 1990. *Sediments: Chemistry and Toxicity of In-Place Pollutants*. Lewis Publishers, Boca Raton, FL.

EPA. 1985. Sediment sampling quality assurance user's guide. Environmental Monitoring Systems Laboratory. Las Vegas, Nevada. EPA/600/4-85/048.

EPA. 1994. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates.

WDNR. 1993 (draft). Field Procedures Manual. Office of Technical Services, Bureau of Water Resources Management.

WDNR. 1990 (draft). Quality Assurance Guidance for Inplace Pollutant Monitoring Activities. Unpublished document on file at Office of Technical Services, Bureau of Water Resources Management.

WI State Laboratory of Hygiene. 1994. Organic Chemistry Manual.

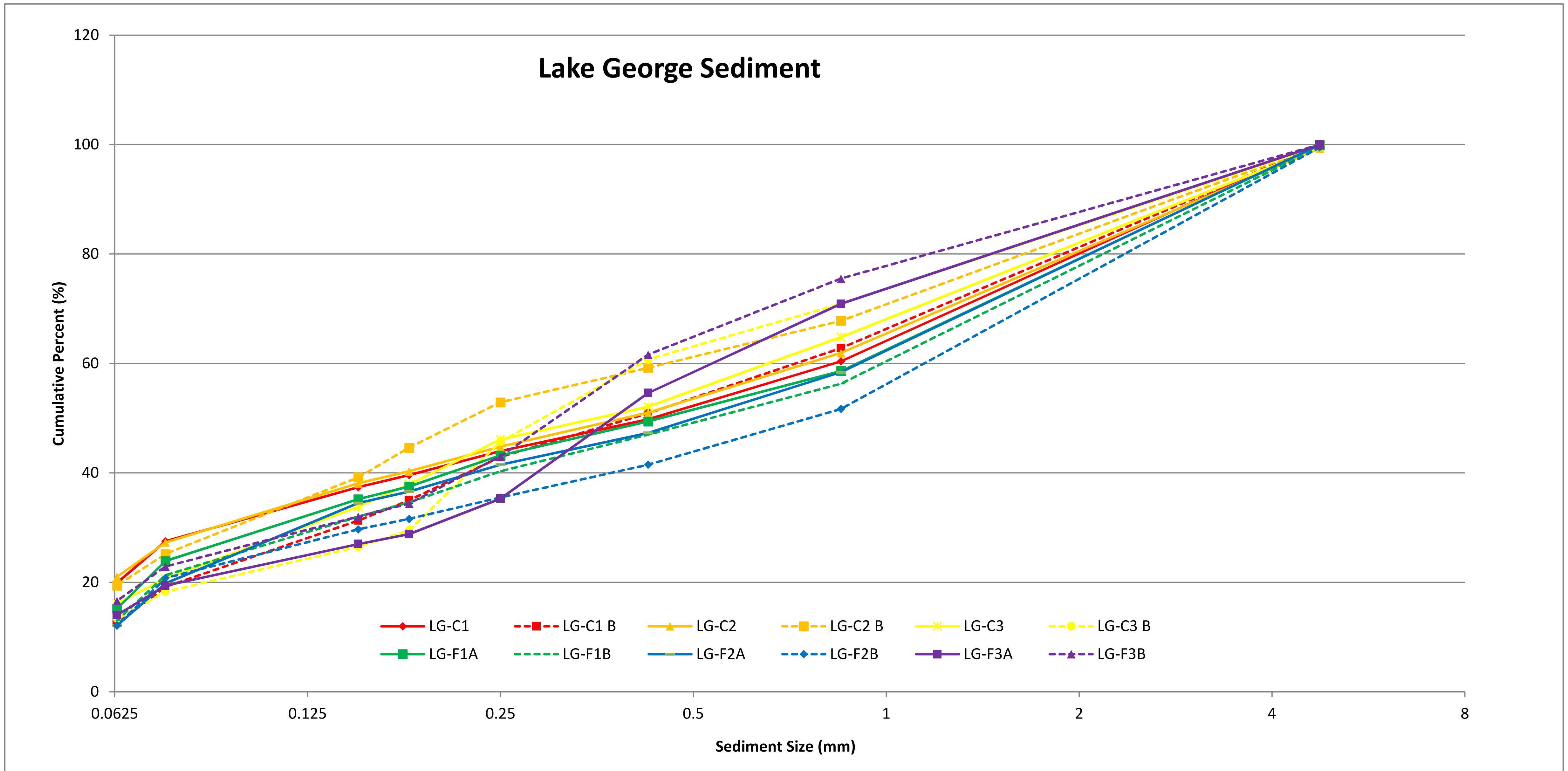
WI State Laboratory of Hygiene. 1992. Inorganic Chemistry Manual.

Adapted from State of Wisconsin Sediment Sampling Guidelines

Appendix C – Contaminant Data

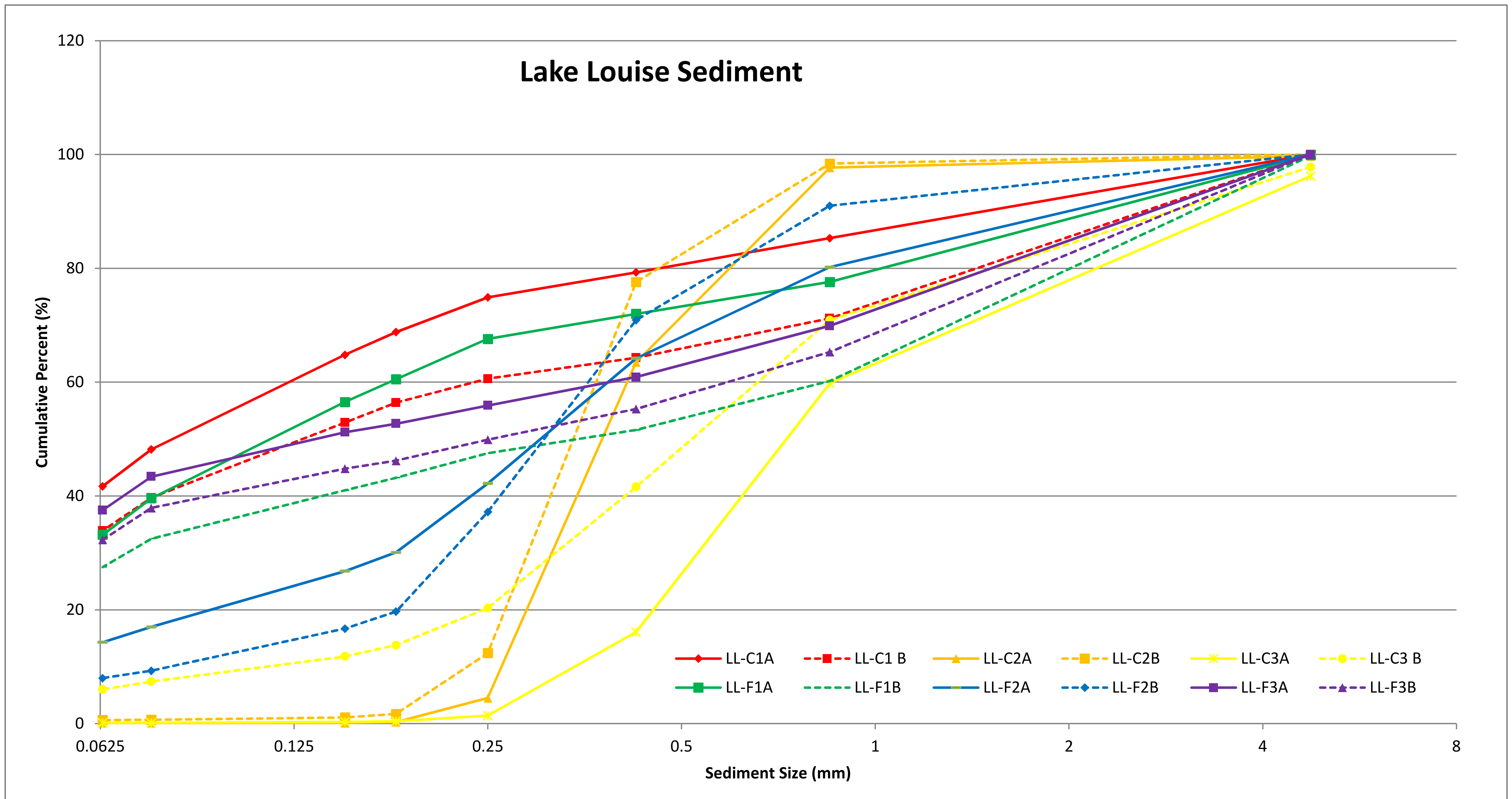
Appendix B - 1: Lake George Sediment Size Distributions

Method	**Sieve**	Diameter (mm)	Sediment Type	units	Sample Locations (ID) LG-C1	LG-C1 B	LG-C2	LG-C2 B	LG-C3	LG-C3 B	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
ASTM C136-84A	#4 Sieve	4.75	Fine Gravel	% passing sieve	100.0	99.9	99.3	99.8	99.5	99.7	99.9	99.6	100.0	99.5	100.0	100.0
ASTM C136-84A	#20 Sieve	0.85	Coarse Sand	% passing sieve	60.4	62.8	61.9	67.8	64.8	70.9	58.6	56.3	58.4	51.7	70.9	75.5
ASTM C136-84A	#40 Sieve	0.425	Medium Sand	% passing sieve	49.8	50.9	51.0	59.2	52.1	60.7	49.4	47.0	47.3	41.5	54.6	61.6
ASTM C136-84A	#60 Sieve	0.25	Medium Sand	% passing sieve	44.0	42.9	44.8	52.9	46.1	45.7	43.2	40.3	41.5	35.5	35.3	43.0
ASTM C136-84A	#80 Sieve	0.18	Fine Sand	% passing sieve	39.6	35.0	40.3	44.6	37.9	29.5	37.5	34.6	36.6	31.6	28.8	34.4
ASTM C136-84A	#100 Sieve	0.15	Very Fine Sand	% passing sieve	37.4	31.3	38.1	39.2	33.8	26.5	35.2	32.0	34.5	29.7	27.0	32.0
ASTM C136-84A	#200 Sieve	0.075	Very Fine Sand	% passing sieve	27.5	19.2	27.3	25.2	20.7	18.3	23.9	21.3	19.8	20.8	19.4	22.9
ASTM C136-84A	#230 Sieve	0.063	Silt	% passing sieve	19.9	12.5	21.0	19.4	16.1	13.4	15.2	13.0	12.1	12.1	14.0	16.6



Appendix C - 2: Lake Louise Sediment Size Distributions

					Sample Locations (ID)											
Method	**Sieve**	Diameter (mm)	Sediment Type	units	LL-C1A	LL-C1 B	LL-C2A	LL-C2 B	LL-C3A	LL-C3 B	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
ASTM C136-84A	#4 Sieve	4.75	Fine Gravel	% passing sieve	100.0	100.0	99.7	100.0	96.2	97.8	99.9	99.8	100.0	100.0	100.0	100.0
ASTM C136-84A	#20 Sieve	0.85	Coarse Sand	% passing sieve	85.3	71.2	97.7	98.4	59.8	70.9	77.6	60.2	80.2	91.0	69.9	65.3
ASTM C136-84A	#40 Sieve	0.425	Medium Sand	% passing sieve	79.3	64.3	63.5	77.6	16.1	41.6	72.0	51.6	64.2	70.9	60.9	55.3
ASTM C136-84A	#60 Sieve	0.25	Medium Sand	% passing sieve	74.9	60.6	4.5	12.4	1.4	20.3	67.6	47.5	42.2	37.2	55.9	49.9
ASTM C136-84A	#80 Sieve	0.18	Fine Sand	% passing sieve	68.8	56.4	0.3	1.7	0.4	13.8	60.5	43.2	30.1	19.7	52.7	46.2
ASTM C136-84A	#100 Sieve	0.15	Very Fine Sand	% passing sieve	64.8	52.9	0.1	1.1	0.3	11.8	56.5	41.0	26.8	16.7	51.2	44.8
ASTM C136-84A	#200 Sieve	0.075	Very Fine Sand	% passing sieve	48.2	39.7	0.1	0.7	0.1	7.4	39.6	32.5	17.0	9.3	43.4	37.9
ASTM C136-84A	#230 Sieve	0.063	Silt	% passing sieve	41.7	33.9	0.1	0.6	0.1	6.0	33.2	27.5	14.3	8.0	37.5	32.3



River Falls Dams - Sediment Contaminant Analysis

CBSQG Comparisons - Data Normalized by TOC

River Falls, WI

Sampling Date: November 23, 2015

000	*Below Limit of Detection (detection limit shown in italics)*
000	Result Exceeds WI Sediment Quality Guidelines - TEC
000	Result Exceeds WI Sediment Quality Guidelines - MEC
000	Result Exceeds WI Sediment Quality Guidelines - PEC
000	Result Exceeds EPA RSLs for Industrial Sites
000	Result Exceeds EPA RSLs for Residential Sites

Constituent	untis	Analytical Method	CAS #	WI CBSQG (TEC)	WI CBSQG (MEC)	WI CBSQG (PEC)	EPA RSL (Resident)	EPA RSL (Indust)	Lake George								
									Channel			Floodplain					
Metals									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
Arsenic	mg/kg	EPA 6010C	7440-38-2	9.8	21.4	33	0.68	3	2.700	1.100	1.900	2.000	4.200	1.300	3.700	1.000	1.500
Cadmium	mg/kg	EPA 6010C	7440-43-9	0.99	3	5	71	980	0.140	0.180	0.180	0.140	*0.026*	0.190	0.045	0.160	0.260
Chromium	mg/kg	EPA 6010C	7440-47-3	43	76.5	110			15.100	14.000	18.100	10.400	21.100	12.500	18.900	14.300	13.700
Hexavalent Chromium	mg/kg	EPA 3060A/7	18540-29-9				0.03	63	*1.400*	*1.300*	*1.500*	4.170	*1.600*	*1.400*	5.850	*1.700*	3.590
Trivalent Chromium	mg/kg	EPA 6010C	16065-83-1				120000	1800000	15.000	14.000	18.000	6.000	21.000	13.000	13.000	14.000	10.000
Copper	mg/kg	EPA 6010C	7440-50-8	32	91	150	3100	47000	11.500	11.200	14.100	8.600	18.000	11.500	16.500	12.400	13.100
Lead	mg/kg	EPA 6010C	7439-92-1	36	83	130	400	800	11.600	15.000	18.100	18.700	22.100	34.500	38.600	31.100	29.900
Mercury	mg/kg	EPA 7471B	7439-97-6	0.18	0.64	1.1	11	46	0.036	0.040	0.140	0.063	0.230	0.059	0.140	0.096	0.280
Nickel	mg/kg	EPA 6010C	7440-02-0	23	36	49	1500	20000	9.000	8.500	10.600	6.700	16.900	7.900	13.300	9.800	9.200
Zinc	mg/kg	EPA 6010C	7440-66-6	120	290	460	23000	350000	50.400	48.700	62.400	40.400	74.300	52.400	71.200	58.400	59.200
PCBs									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
Aroclor-1016	mg/kg	EPA 8082A	12674-11-2				4	27		*0.030*		*0.014*		*0.013*		*0.015*	
Aroclor-1221	mg/kg	EPA 8082A	11104-28-2				0.2	0.83		*0.025*		*0.012*		*0.011*		*0.013*	
Aroclor-1232	mg/kg	EPA 8082A	11141-16-5				0.17	0.72		*0.028*		*0.013*		*0.012*		*0.014*	
Aroclor-1242	mg/kg	EPA 8082A	53469-21-9				0.23	0.95		*0.028*		*0.013*		*0.011*		*0.014*	
Aroclor-1248	mg/kg	EPA 8082A	12672-29-6				0.23	0.95		*0.022*		*0.011*		*0.009*		*0.011*	
Aroclor-1254	mg/kg	EPA 8082A	11097-69-1				0.22	0.74		*0.018*		*0.009*		0.039		0.024	
Aroclor-1260	mg/kg	EPA 8082A	11096-82-5				0.24	0.99		*0.017*		0.014		0.023		0.021	
Total PCBs	mg/kg			0.06	0.368	0.676						0.014		0.062		0.045	
PAHs									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
1-Methylnaphthalene	mg/kg	EPA 8310	90-12-0				18	73	*0.097*	*0.528*	*0.269*	*0.212*	*0.190*	*0.931*	*0.915*	*0.111*	*0.119*
2-Methylnaphthalene	mg/kg	EPA 8310	91-57-6	0.0202	0.111	0.201	240	3000	*0.087*	*0.482*	*0.238*	*0.192*	*0.171*	*0.850*	*0.814*	*0.102*	*0.107*
Acenaphthene	mg/kg	EPA 8310	83-32-9	0.0067	0.048	0.089	3400	33000	*0.126*	*0.688*	*0.342*	*0.274*	*0.247*	*1.215*	*1.153*	*0.148*	*0.154*
Acenaphthylene	mg/kg	EPA 8310	208-96-8	0.0059	0.067	0.128			*0.114*	*0.619*	*0.311*	*0.245*	*0.224*	*1.093*	*1.051*	*0.131*	*0.138*
Anthracene	mg/kg	EPA 8310	120-12-7	0.0572	0.451	0.845	17000	170000	*0.033*	*0.177*	*0.089*	*0.072*	*0.065*	*0.312*	*0.298*	*0.038*	*0.039*
Benzo(a)anthracene	mg/kg	EPA 8310	56-55-3	0.108	0.579	1.05	0.15	2.1	0.066	0.032	0.090	0.068	0.070	0.156	0.123	0.078	0.096
Benzo(a)pyrene	mg/kg	EPA 8310	50-32-8	0.15	0.8	1.45	0.015	0.21	0.078	0.204	0.121	0.062	0.070	0.131	0.126	0.059	*0.007*
Benzo(b)fluoranthene	mg/kg	EPA 8310	205-99-2	0.24	6.82	13.4	0.15	2.1	0.102	0.069	0.115	0.048	*0.013*	*0.061*	*0.061*	0.055	*0.008*
Benzo(g,h,i)perylene	mg/kg	EPA 8310	191-24-2	0.17	1.685	3.2			0.085	*0.071*	0.079	*0.028*	*0.025*	*0.126*	*0.119*	0.033	*0.016*
Benzo(k)fluoranthene	mg/kg	EPA 8310	207-08-9	0.24	6.82	13.4	1.5	21	0.045	0.026	0.065	0.040	*0.009*	0.109	0.078	0.073	*0.006*
Chrysene	mg/kg	EPA 8310	218-01-9	0.166	0.728	1.29	15	210	0.055	*0.087*	0.073	*0.035*	*0.032*	*0.154*	*0.149*	0.051	0.063
Dibenzo(a,h)anthracene	mg/kg	EPA 8310	53-70-3	0.033	0.084	0.135	0.015	0.21	*0.027*	*0.140*	*0.071*	*0.058*	*0.049*	*0.251*	*0.241*	*0.030*	*0.031*
Fluoranthene	mg/kg	EPA 8310	206-44-0	0.423	1.327	2.23	2300	22000	0.160	0.132	0.245	0.126	0.104	0.271	0.240	0.130	0.168
Fluorene	mg/kg	EPA 8310	86-73-7	0.0774	0.307	0.536	2300	22000	*0.027*	*0.140*	*0.071*	*0.058*	*0.049*	*0.251*	*0.241*	*0.030*	*0.031*
Indeno(1,2,3-cd)pyrene	mg/kg	EPA 8310	193-39-5	0.2	1.7	3.2	0.15	2.1	0.112	0.083	0.121	0.053	*0.025*	*0.126*	*0.119*	0.069	*0.016*
Naphthalene	mg/kg	EPA 8310	91-20-3	0.176	0.369	0.561	3.6	18	*0.056*	*0.298*	*0.155*	*0.120*	*0.106*	*0.526*	*0.508*	*0.066*	*0.067*
Phenanthrene	mg/kg	EPA 8310	85-01-8	0.204	0.687	1.17			0.064	*0.053*	0.125	0.045	0.079	*0.093*	*0.092*	0.068	*0.012*
Pyrene	mg/kg	EPA 8310	129-00-0	0.195	0.858	1.52	1700	17000	0.155	0.092	0.289	0.134	0.137	0.231	0.183	0.111	0.159
Total PAHs	mg/kg	EPA 8310		1.6	12.2	22.8			0.921	0.637	1.324	0.576	0.460	0.898	0.750	0.726	0.487

River Falls Dams - Sediment Contaminant Analysis

CBSQG Comparisons - Data Normalized by TOC

River Falls, WI

Sampling Date: November 23, 2015

000	*Below Limit of Detection (detection limit shown in italics)*
000	Result Exceeds WI Sediment Quality Guidelines - TEC
000	Result Exceeds WI Sediment Quality Guidelines - MEC
000	Result Exceeds WI Sediment Quality Guidelines - PEC
000	Result Exceeds EPA RSLs for Industrial Sites
000	Result Exceeds EPA RSLs for Residential Sites

Constituent	untis	Analytical Method	CAS #	WI CBSQG (TEC)	WI CBSQG (MEC)	WI CBSQG (PEC)	EPA RSL (Resident)	EPA RSL (Indust)	Lake George Channel			Floodplain					
Organochlorine Pesticides									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
4,4'-DDD	mg/kg	EPA 8081B	72-54-8	0.0049	0.0165	0.028	2.3	9.6									
4,4'-DDE	mg/kg	EPA 8081B	72-55-9	0.0032	0.017	0.031	2	9.3									
4,4'-DDT	mg/kg	EPA 8081B	50-29-3	0.0042	0.0336	0.063	1.9	8.5									
Aldrin	mg/kg	EPA 8081B	309-00-2	0.002	0.041	0.08	0.039	0.18									
alpha-BHC	mg/kg	EPA 8081B	319-84-6	0.006	0.0053	0.1	0.086	0.36									
alpha-Chlordane	mg/kg	EPA 8081B	5103-71-9														
beta-BHC	mg/kg	EPA 8081B	319-85-7	0.005	0.108	0.21	0.3	1.3									
Chlordane (Technical)	mg/kg	EPA 8081B	57-74-9	0.0032	0.0106	0.018	1.7	7.5									
delta-BHC	mg/kg	EPA 8081B	319-86-8														
Dieldrin	mg/kg	EPA 8081B	60-57-1	0.0019	0.032	0.062	0.034	0.14									
Endosulfan I	mg/kg	EPA 8081B	959-98-8				470	7000				No Data					
Endosulfan II	mg/kg	EPA 8081B	33213-65-9														
Endosulfan sulfate	mg/kg	EPA 8081B	1031-07-8														
Endrin	mg/kg	EPA 8081B	72-20-8	0.0022	0.1046	0.207	19	250									
Endrin aldehyde	mg/kg	EPA 8081B	7421-93-4														
Endrin ketone	mg/kg	EPA 8081B	53494-70-5														
gamma-Chlordane	mg/kg	EPA 8081B	5103-74-2														
Heptachlor	mg/kg	EPA 8081B	76-44-8				0.13	0.63									
Heptachlor epoxide	mg/kg	EPA 8081B	1024-57-3	0.0025	0.0093	0.016	0.07	0.33									
Lindane	mg/kg	EPA 8081B	58-89-9	0.003	0.004	0.005	0.57	25									
Methoxychlor	mg/kg	EPA 8081B	72-43-5				320	4100									
Toxaphene	mg/kg	EPA 8081B	8001-35-2	0.001	0.0015	0.002	0.49	21									
Chlorinated Herbicides									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
2,4-D	mg/kg	EPA 8151A	94-75-7				700	9600									
2,4-DB	mg/kg	EPA 8151A	94-82-6				510	6600									
2,4,5-TP	mg/kg	EPA 8151A	93-72-1				510	6600									
2,4,5-T	mg/kg	EPA 8151A	93-76-5				630	8200									
Dalapon	mg/kg	EPA 8151A	75-99-0				1900	25000									
Dicamba	mg/kg	EPA 8151A	1918-00-9	0.18		13	1900	25000				No Data					
Dichloroprop	mg/kg	EPA 8151A	94-75-7				700	9600									
Dinoseb	mg/kg	EPA 8151A	88-85-7				63	820									
Pentachlorophenol	mg/kg	EPA 8151A	87-86-5	0.15	0.175	0.2	1	4									
Picloram	mg/kg	EPA 8151A	1918-02-1				4400	57000									
Chloramben	mg/kg	EPA 8151A	133-90-4				950	12000									
Benatzon	mg/kg	EPA 8151A	25057-89-0				1900	25000									
Acifluorofen	mg/kg	EPA 8151A	50594-66-6														
Other									LG-C1	LG-C2	LG-C3	LG-F1A	LG-F1B	LG-F2A	LG-F2B	LG-F3A	LG-F3B
Total Organic Carbon	mg/kg	L-Kahn/9060/	TOC						48300	43600	96600	20800	26300	24700	29500	24400	25300
Total Organic Carbon	%								4.8	4.4	9.7	2.1	2.6	2.5	3.0	2.4	2.5
Solids, Percent	%	EPA 8000C	SOLID						36.7	35.0	42.0	32.4	40.3	35.1	43.8	45.9	49.5
Percent Moisture	%	SM 2540G	MOIST						63.3	65.0	58.0	67.6	59.7	64.9	56.3	54.1	50.5
Gasoline Range Organics	mg/kg	WDNR GRO	GASCOMP						2.1	2.0	2.2	1.9	2.2	2.0	2.3	2.4	2.6
Diesel Range Organics	mg/kg	WDNR DRO	DIESELCOMP						5.5	32.3	31.5	55.7	59.8	3.8	55.6	40.1	46.0

36.7	35	42	32.4	40.3	35.1	43.8	45.9	49.5

NOTES

WI-Wisconsin DNR. 2003.Consensus-Based Sediment Quality Guidelines. Recommendations for Use and Applications. Interim Guidance. WT-732. 35pp. http://dnr.wi.gov/topic/brownfields/documents/cbsqg_interim_final.pdf

***EPA- Region 3 (Mid-Atlantic) Screening Values from multiple sources - http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fw/screenbench.htm

River Falls Dams - Sediment Contaminant Analysis

CBSQG Comparisons - Data Normalized by TOC

River Falls, WI

Sampling Date: November 23, 2015

Constituent	untis	Analytical Method	CAS #	WI CBSQG (TEC)	WI CBSQG (MEC)	WI CBSQG (PEC)	EPA RSL (Resident)	EPA RSL (Indust)	Lake Louise								
									Channel			Floodplain					
Metals									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
Arsenic	mg/kg	EPA 6010C	7440-38-2	9.8	21.4	33	0.68	3	35.400	4.700	4.000	2.000	4.500	1.300	0.820	7.100	4.900
Cadmium	mg/kg	EPA 6010C	7440-43-9	0.99	3	5	71	980	2.900	0.120	0.095	0.190	0.310	0.084	0.052	0.047	0.037
Chromium	mg/kg	EPA 6010C	7440-47-3	43	76.5	110			23.000	19.900	12.400	14.500	32.700	11.100	18.300	28.800	25.200
Hexavalent Chromium	mg/kg	EPA 3060A/7	18540-29-9				0.03	63	2.100	6.200	4.800	1.700	2.600	1.700	2.700	7.440	11.100
Trivalent Chromium	mg/kg	EPA 6010C	16065-83-1				120000	1800000	23.000	20.000	12.000	15.000	33.000	11.000	18.000	21.000	14.000
Copper	mg/kg	EPA 6010C	7440-50-8	32	91	150	3100	47000	28.000	10.700	8.800	12.900	28.000	10.100	13.800	24.200	21.900
Lead	mg/kg	EPA 6010C	7439-92-1	36	83	130	400	800	23.400	7.700	5.900	15.900	28.500	8.700	10.700	23.800	20.600
Mercury	mg/kg	EPA 7471B	7439-97-6	0.18	0.64	1.1	11	46	0.130	0.010	0.017	0.077	0.280	0.037	0.064	0.400	0.370
Nickel	mg/kg	EPA 6010C	7440-02-0	23	36	49	1500	20000	15.800	10.500	9.800	8.900	27.900	6.500	10.900	25.100	20.900
Zinc	mg/kg	EPA 6010C	7440-66-6	120	290	460	23000	350000	77.000	43.800	29.800	72.900	79.700	44.900	54.500	74.900	71.600
PCBs									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
Aroclor-1016	mg/kg	EPA 8082A	12674-11-2				4	27				0.010		0.030		0.017	
Aroclor-1221	mg/kg	EPA 8082A	11104-28-2				0.2	0.83				0.009		0.030		0.014	
Aroclor-1232	mg/kg	EPA 8082A	11141-16-5				0.17	0.72				0.010		0.030		0.016	
Aroclor-1242	mg/kg	EPA 8082A	53469-21-9				0.23	0.95				0.009		0.030		0.015	
Aroclor-1248	mg/kg	EPA 8082A	12672-29-6				0.23	0.95				0.008		0.030		0.012	
Aroclor-1254	mg/kg	EPA 8082A	11097-69-1				0.22	0.74				0.006		0.030		0.010	
Aroclor-1260	mg/kg	EPA 8082A	11096-82-5				0.24	0.99				0.006		0.030		0.009	
Total PCBs	mg/kg			0.06	0.368	0.676											
PAHs									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
1-Methylnaphthalene	mg/kg	EPA 8310	90-12-0				18	73	0.093	0.909	0.889	0.784	0.042	1.228	0.220	0.025	0.024
2-Methylnaphthalene	mg/kg	EPA 8310	91-57-6	0.0202	0.111	0.201	240	3000	0.084	0.818	0.778	0.700	0.038	1.096	0.196	0.022	0.021
Acenaphthene	mg/kg	EPA 8310	83-32-9	0.0067	0.048	0.089	3400	33000	0.119	1.182	1.111	1.008	0.056	1.623	0.285	0.031	0.031
Acenaphthylene	mg/kg	EPA 8310	208-96-8	0.0059	0.067	0.128			0.108	1.045	1.000	0.896	0.047	1.447	0.252	0.029	0.028
Anthracene	mg/kg	EPA 8310	120-12-7	0.0572	0.451	0.845	17000	170000	0.032	0.295	0.289	0.261	0.014	0.412	0.075	0.008	0.008
Benzo(a)anthracene	mg/kg	EPA 8310	56-55-3	0.108	0.579	1.05	0.15	2.1	0.047	0.039	0.567	0.319	0.009	1.228	0.016	0.007	0.007
Benzo(a)pyrene	mg/kg	EPA 8310	50-32-8	0.15	0.8	1.45	0.015	0.21	0.005	0.092	0.678	0.083	0.009	0.070	0.023	0.001	0.010
Benzo(b)fluoranthene	mg/kg	EPA 8310	205-99-2	0.24	6.82	13.4	0.15	2.1	0.006	0.069	0.516	0.053	0.003	0.083	0.014	0.002	0.002
Benzo(g,h,i)perylene	mg/kg	EPA 8310	191-24-2	0.17	1.685	3.2			0.037	0.118	0.441	0.104	0.006	0.167	0.029	0.004	0.003
Benzo(k)fluoranthene	mg/kg	EPA 8310	207-08-9	0.24	6.82	13.4	1.5	21	0.044	0.048	0.351	0.036	0.002	0.057	0.010	0.001	0.001
Chrysene	mg/kg	EPA 8310	218-01-9	0.166	0.728	1.29	15	210	0.042	0.150	0.536	0.129	0.007	0.732	0.036	0.004	0.007
Dibenzo(a,h)anthracene	mg/kg	EPA 8310	53-70-3	0.033	0.084	0.135	0.015	0.21	0.025	0.236	0.233	0.207	0.011	0.329	0.056	0.007	0.006
Fluoranthene	mg/kg	EPA 8310	206-44-0	0.423	1.327	2.23	2300	22000	0.112	0.179	1.378	0.187	0.021	2.728	0.051	0.020	0.016
Fluorene	mg/kg	EPA 8310	86-73-7	0.0774	0.307	0.536	2300	22000	0.025	0.236	0.233	0.207	0.011	0.329	0.056	0.007	0.006
Indeno(1,2,3-cd)pyrene	mg/kg	EPA 8310	193-39-5	0.2	1.7	3.2	0.15	2.1	0.078	0.118	0.594	0.104	0.009	0.167	0.045	0.003	0.003
Naphthalene	mg/kg	EPA 8310	91-20-3	0.176	0.369	0.561	3.6	18	0.052	0.500	0.494	0.448	0.023	0.702	0.121	0.014	0.013
Phenanthrene	mg/kg	EPA 8310	85-01-8	0.204	0.687	1.17			0.009	0.091	0.556	0.078	0.004	1.228	0.022	0.002	0.002
Pyrene	mg/kg	EPA 8310	129-00-0	0.195	0.858	1.52	1700	17000	0.106	0.149	1.467	0.194	0.013	3.447	0.035	0.014	0.012
Total PAHs	mg/kg	EPA 8310		1.6	12.2	22.8			0.518	0.575	7.082	0.783	0.061	9.364	0.170	0.045	0.053

River Falls Dams - Sediment Contaminant Analysis

CBSQG Comparisons - Data Normalized by TOC

River Falls, WI

Sampling Date: November 23, 2015

Constituent	untis	Analytical Method	CAS #	WI CBSQG (TEC)	WI CBSQG (MEC)	WI CBSQG (PEC)	EPA RSL (Resident)	EPA RSL (Indust)	Lake Louise								
									Channel			Floodplain					
Organochlorine Pesticides									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
4,4'-DDD	mg/kg	EPA 8081B	72-54-8	0.0049	0.0165	0.028	2.3	9.6		**0.018**							
4,4'-DDE	mg/kg	EPA 8081B	72-55-9	0.0032	0.017	0.031	2	9.3		*0.018*							
4,4'-DDT	mg/kg	EPA 8081B	50-29-3	0.0042	0.0336	0.063	1.9	8.5		*0.024*							
Aldrin	mg/kg	EPA 8081B	309-00-2	0.002	0.041	0.08	0.039	0.18		*0.027*							
alpha-BHC	mg/kg	EPA 8081B	319-84-6	0.006	0.0053	0.1	0.086	0.36		*0.015*							
alpha-Chlordane	mg/kg	EPA 8081B	5103-71-9							*0.015*							
beta-BHC	mg/kg	EPA 8081B	319-85-7	0.005	0.108	0.21	0.3	1.3		*0.015*							
Chlordane (Technical)	mg/kg	EPA 8081B	57-74-9	0.0032	0.0106	0.018	1.7	7.5		*0.268*							
delta-BHC	mg/kg	EPA 8081B	319-86-8							*0.012*							
Dieldrin	mg/kg	EPA 8081B	60-57-1	0.0019	0.032	0.062	0.034	0.14		*0.015*							
Endosulfan I	mg/kg	EPA 8081B	959-98-8				470	7000		*0.015*							
Endosulfan II	mg/kg	EPA 8081B	33213-65-9							*0.007*			No Data				
Endosulfan sulfate	mg/kg	EPA 8081B	1031-07-8							*0.009*							
Endrin	mg/kg	EPA 8081B	72-20-8	0.0022	0.1046	0.207	19	250		*0.009*							
Endrin aldehyde	mg/kg	EPA 8081B	7421-93-4							*0.012*							
Endrin ketone	mg/kg	EPA 8081B	53494-70-5							*0.008*							
gamma-Chlordane	mg/kg	EPA 8081B	5103-74-2							*0.008*							
Heptachlor	mg/kg	EPA 8081B	76-44-8				0.13	0.63		*0.009*							
Heptachlor epoxide	mg/kg	EPA 8081B	1024-57-3	0.0025	0.0093	0.016	0.07	0.33		*0.008*							
Lindane	mg/kg	EPA 8081B	58-89-9	0.003	0.004	0.005	0.57	25		**0.018**							
Methoxychlor	mg/kg	EPA 8081B	72-43-5				320	4100		*0.015*							
Toxaphene	mg/kg	EPA 8081B	8001-35-2	0.001	0.0015	0.002	0.49	21		*0.327*							
Chlorinated Herbicides									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
2,4-D	mg/kg	EPA 8151A	94-75-7				700	9600		*0.006*							
2,4-DB	mg/kg	EPA 8151A	94-82-6				510	6600		*0.012*							
2,4,5-TP	mg/kg	EPA 8151A	93-72-1				510	6600		*0.001*							
2,4,5-T	mg/kg	EPA 8151A	93-76-5				630	8200		*0.001*							
Dalapon	mg/kg	EPA 8151A	75-99-0				1900	25000		*0.015*							
Dicamba	mg/kg	EPA 8151A	1918-00-9	0.18		13	1900	25000		*0.001*			No Data				
Dichloroprop	mg/kg	EPA 8151A	94-75-7				700	9600		*0.005*							
Dinoseb	mg/kg	EPA 8151A	88-85-7				63	820		*0.002*							
Pentachlorophenol	mg/kg	EPA 8151A	87-86-5	0.15	0.175	0.2	1	4		*0.001*							
Picloram	mg/kg	EPA 8151A	1918-02-1				4400	57000		*0.001*							
Chloramben	mg/kg	EPA 8151A	133-90-4				950	12000		*0.001*							
Benatzon	mg/kg	EPA 8151A	25057-89-0				1900	25000		*0.003*							
Acifluorofen	mg/kg	EPA 8151A	50594-66-6							*0.001*							
Other									LL-C1	LL-C2	LL-C3	LL-F1A	LL-F1B	LL-F2A	LL-F2B	LL-F3A	LL-F3B
Total Organic Carbon	mg/kg	L-Kahn/9060/	TOC						34400	2200	1800	35700	21300	22800	21400	32100	32200
Total Organic Carbon	%								3.4	0.2	0.2	3.6	2.1	2.3	2.1	3.2	3.2
Solids, Percent	%	EPA 8000C	SOLID						52.8	84.8	80.8	46.4	66.6	47.0	67.8	62.4	60.7
Percent Moisture	%	SM 2540G	MOIST						47.2	15.2	19.2	53.6	33.4	53.0	32.2	37.6	39.3
Gasoline Range Organics	mg/kg	WDNR GRO	GASCOMP						2.8	8.5	6.8	2.4	3.9	2.5	4.0	3.5	3.3
Diesel Range Organics	mg/kg	WDNR DRO	DIESELCOMP						65.9	13.3	10.1	18.2	40.9	8.9	45.6	33.2	75.6

NOTES

WI-Wisconsin DNR. 2003.Consensus-Based Sediment Quality Guidelines. Recommendations for Use and Applications. Interim Guidance. WT-732. 35p

***EPA- Region 3 (Mid-Atlantic) Screening Values from multiple sources - http://www.epa.gov/reg3hwmd/risk/eco/btag/sbv/fw/screenbench.htm

MEMORANDUM

To: Utility Advisory Board

From: Tamarra Jaworski, Engineer Technician and David Keating, Civil Engineer

Date: March 21, 2016

Re: Resolution Supporting Bid Award for 2016 Sanitary Sewer Lining Project

---

BACKGROUND

Maintenance and rehabilitation of existing sewer system infrastructure is essential to preserving the sanitary sewer system. The 2008 Sanitary Sewer Collection System Study reviewed the existing system and found that nearly half of the existing sanitary sewer collection system consists of clay tile pipe, much with unknown date of installation and some pipes estimated to have been installed in the early 1900's. Since this study, we have been replacing and rehabilitating the poor-conditioned clay pipes annually.

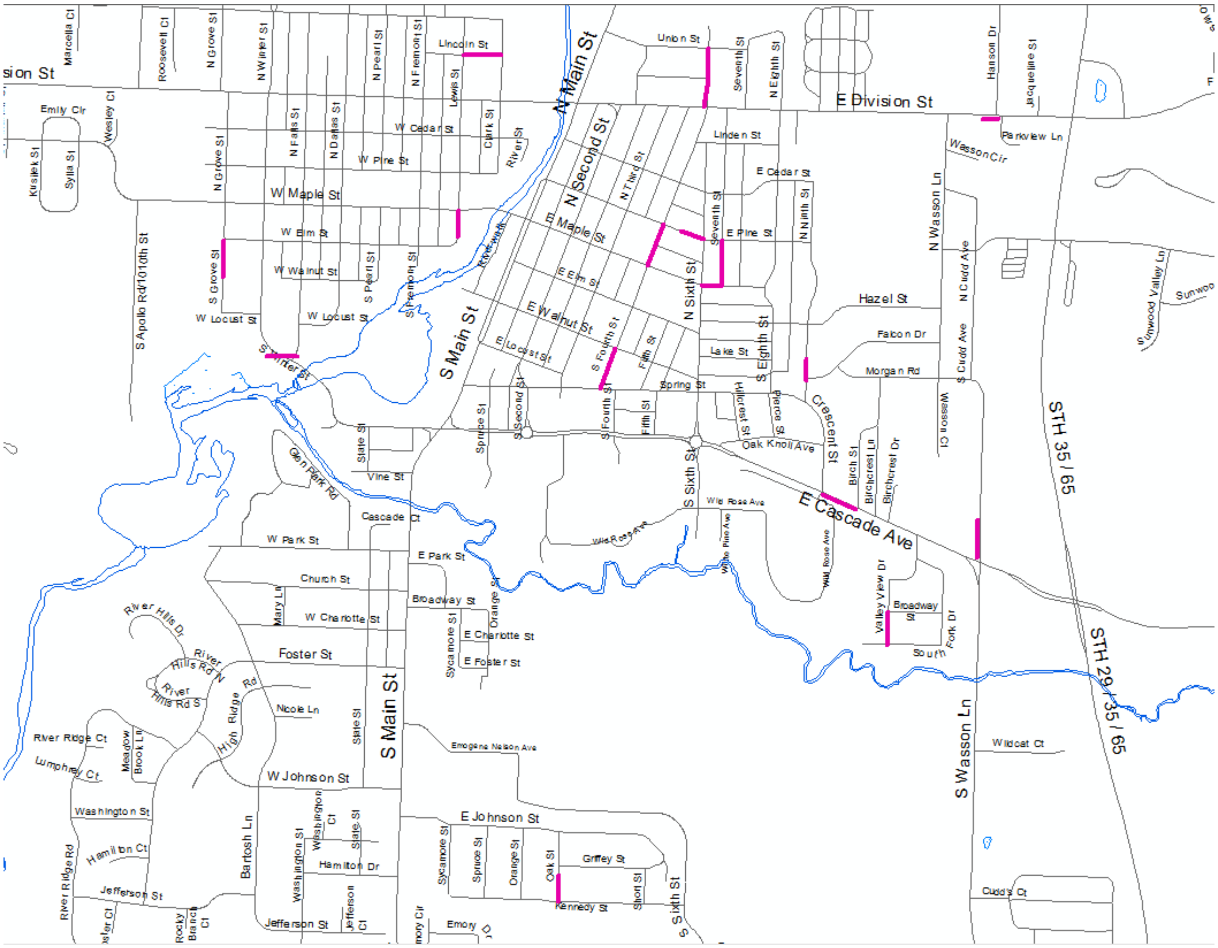
Pipe replacement may be necessary if the pipe capacity is not adequate, if there are sags or poor slope conditions, or if the condition of the existing pipe does not allow for rehabilitation.

When pipe replacement is not necessary, one cost-effective rehabilitation method is sewer lining. This method does not require opening trenches in the street as pipes can be lined by accessing existing manholes.

The liner reduces the diameter of the existing pipe approximately ¼". However, the flow capacity of the pipe system is typically increased due to the liner having reduced friction compared to the clay pipe.

DISCUSSION

The 2016 Sewer Fund budget includes $160,000 in the sewer maintenance line item for sanitary sewer pipe rehabilitation and maintenance. For 2016, staff identified the locations as shown in the following figure for the sanitary sewer lining rehabilitation to be completed.



The City requested competitive bid proposals for the 2016 sanitary sewer lining project for the above identified locations. Bid results are as follows:

	Base Bid Total
Engineers Estimate	$138,733.16
Insituform	$137,470.70
Terra Engineering & Construction	$139,654.00
Visu-Sewer Inc.	$141,734.00
Hydro-Klean, LLC	$146,535.32
Lametti & sons Inc.	$147,780.00
SAK Construction	$161,218.00
Michels Pipe Service	$161,917.00
Veit & Company	$163,676.00

Bidding documents clearly indicate that the City will determine the low bidder based on the base bid.

FINANCIAL CONSIDERATIONS

The lowest bid is $137,470.70 by Insituform Technologies. This is below the budgeted amount for the work.

CONCLUSION

Staff recommends approval of the attached resolution supporting bid award to Insituform Technologies for the provision of the 2016 Sanitary Sewer Lining Project.

City of River Falls

2016 Sanitary Sewer Lining Project

River Falls Municipal Utilities

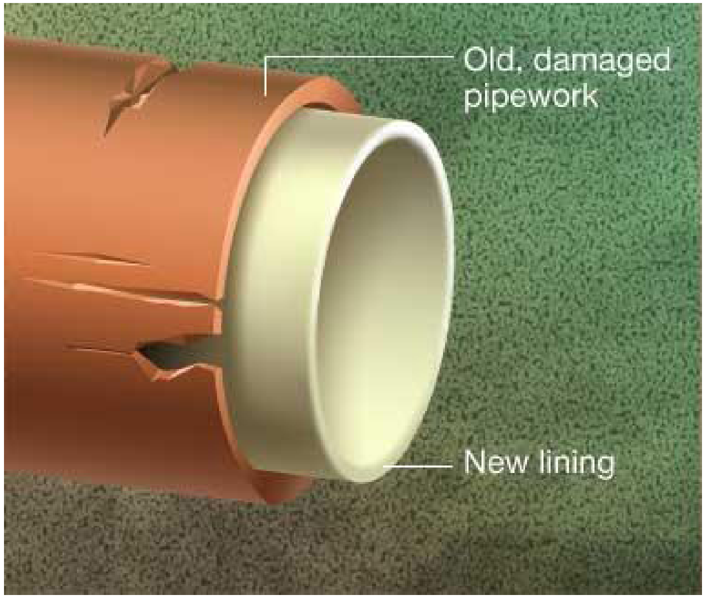
POWERFUL CHOICES

a sustainable energy project for river falls

CIPP Insituform Video

- https://youtu.be/FY_wE71GRyk

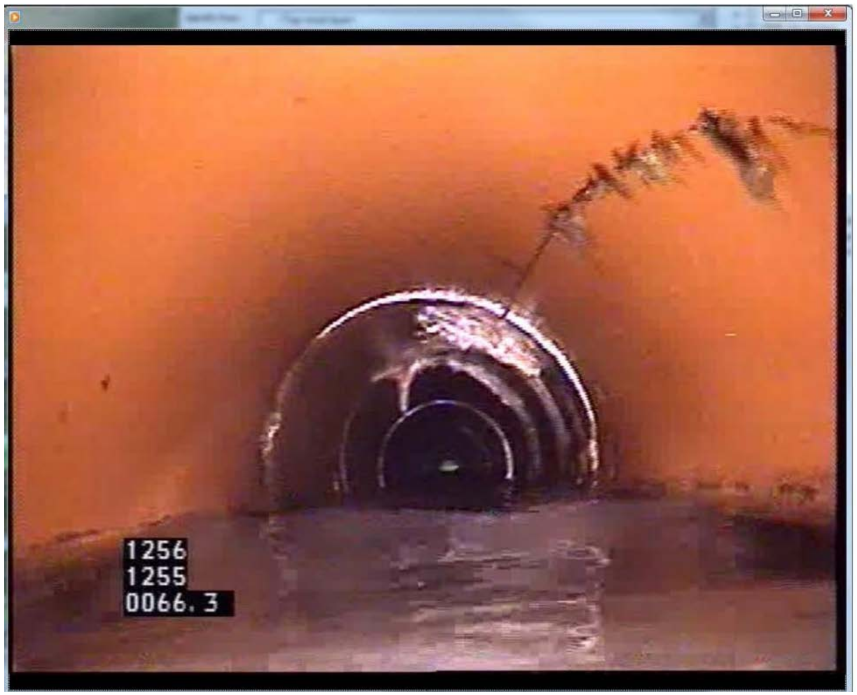
CIPP
Cured in place pipe



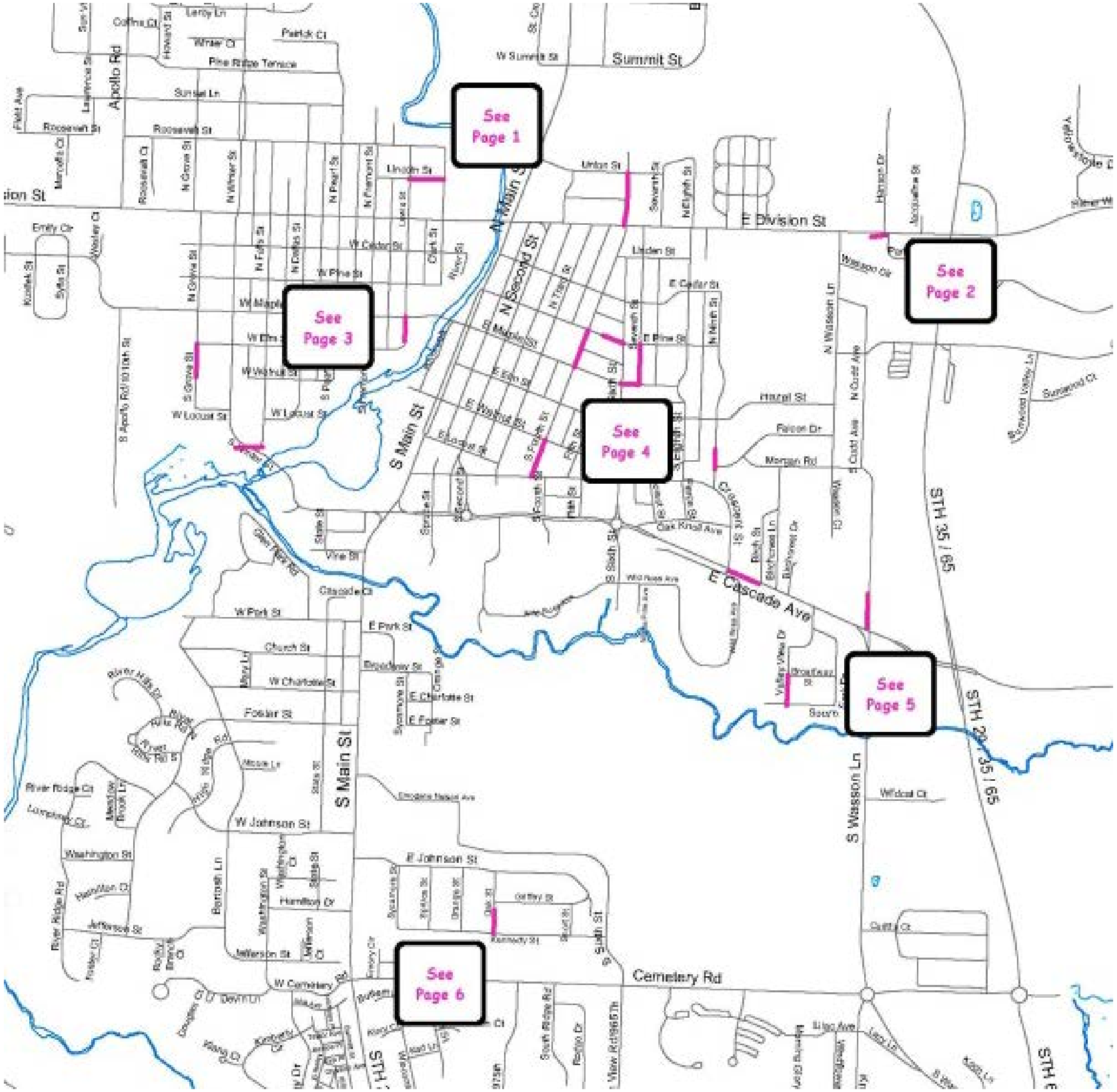
POWERFUL CHOICES
a sustainable energy project for river falls

City of RIVER FALLS

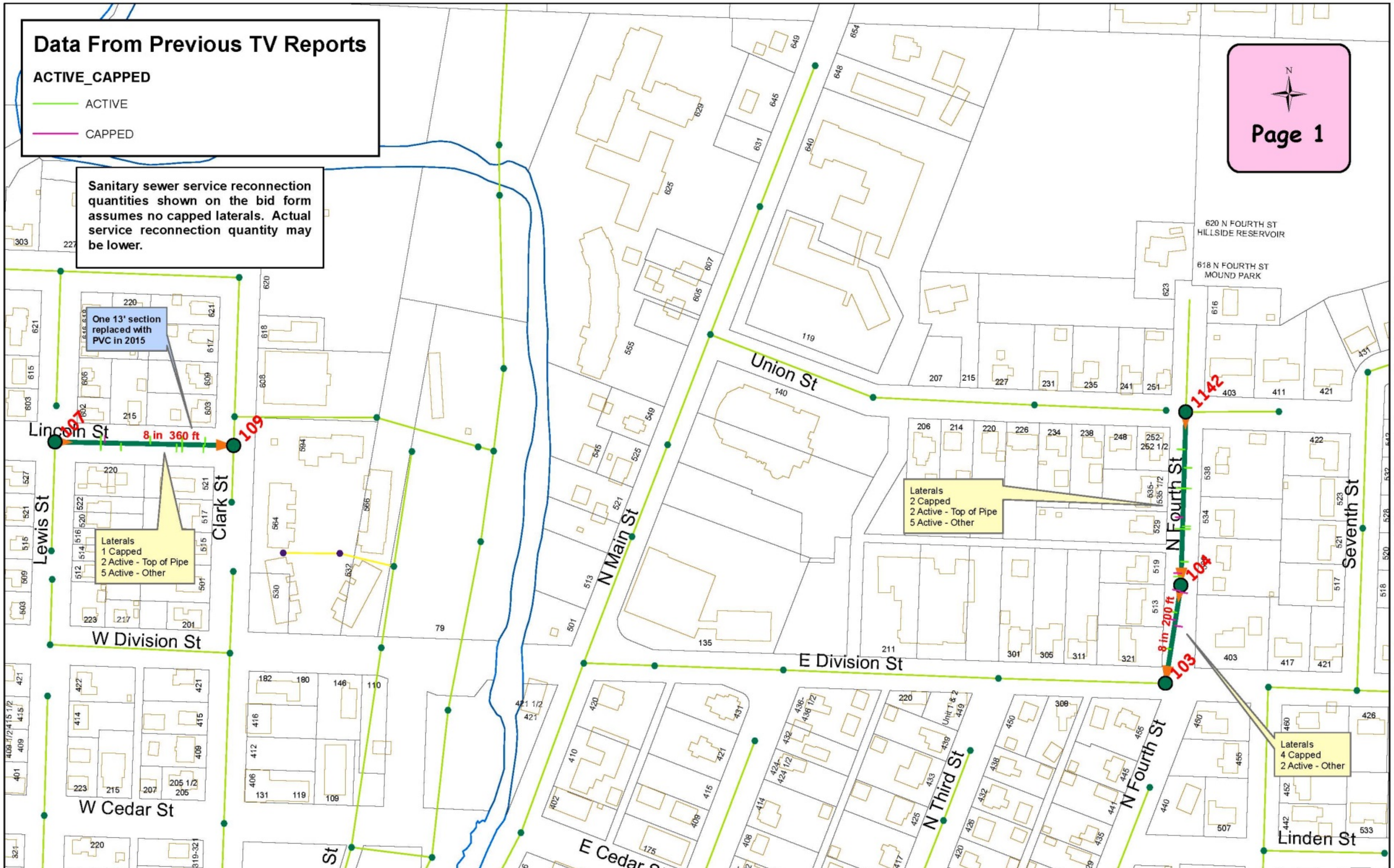
Pipe before and after lining.



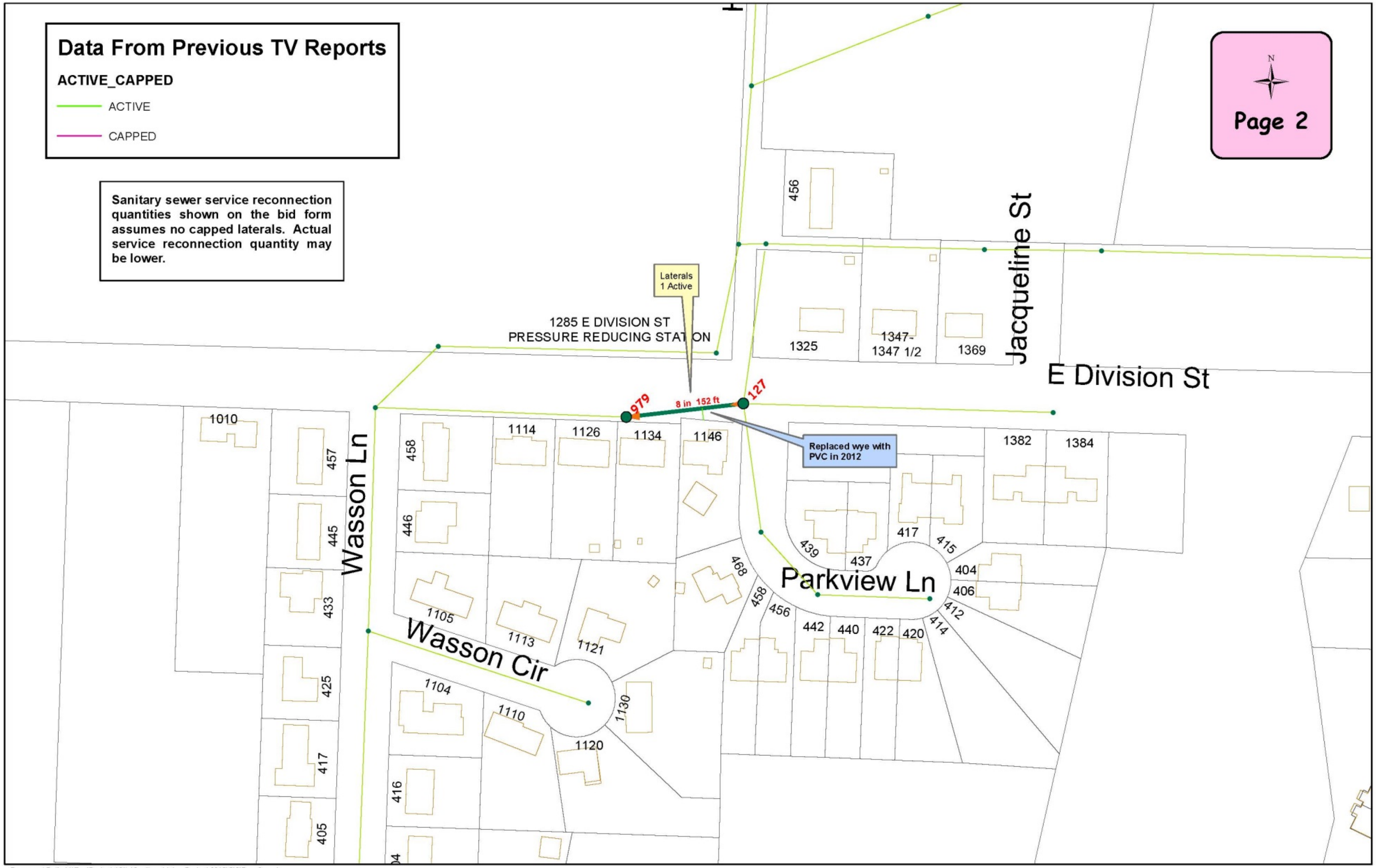
Overview of the lining area.



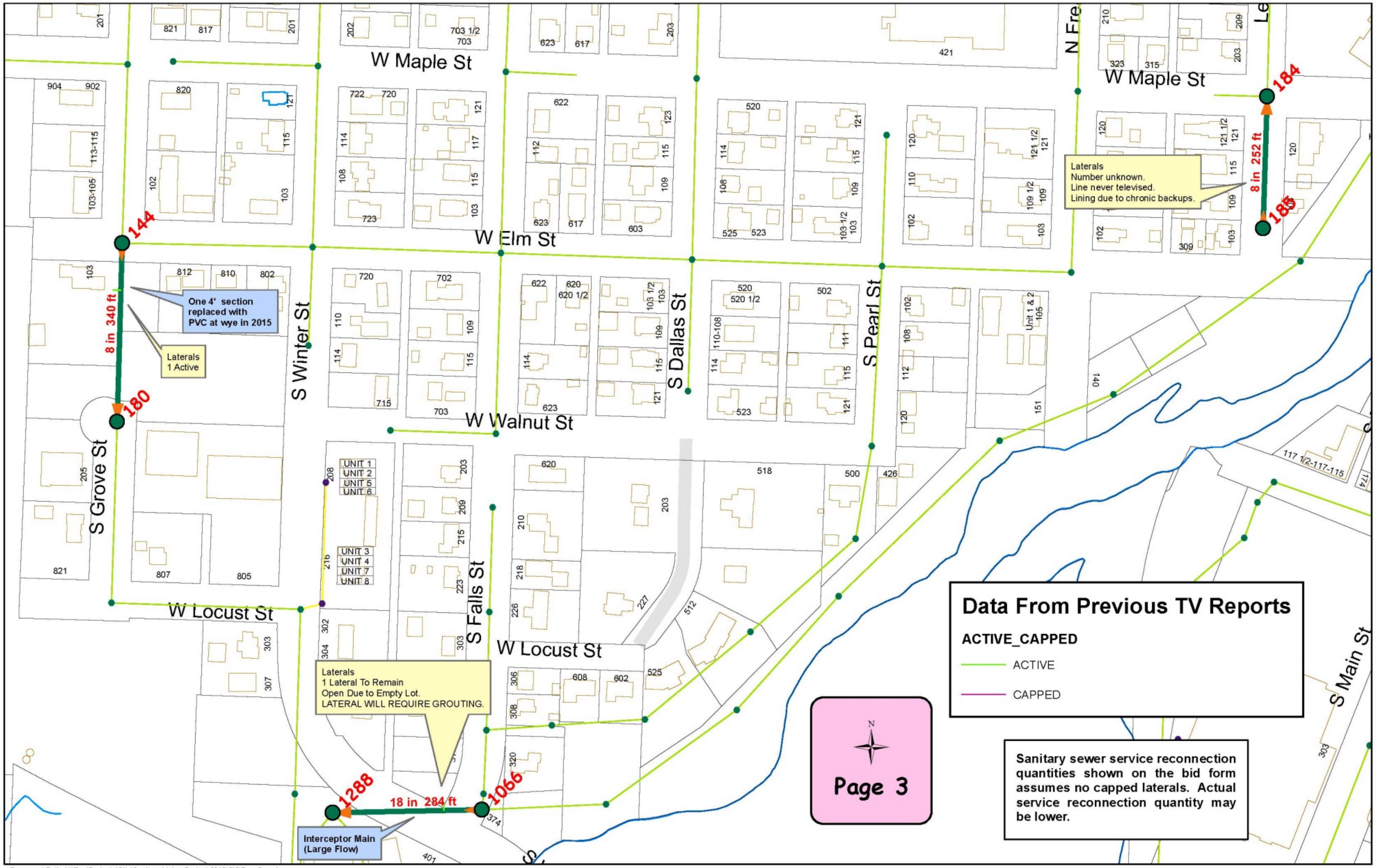
City of RIVER FALLS



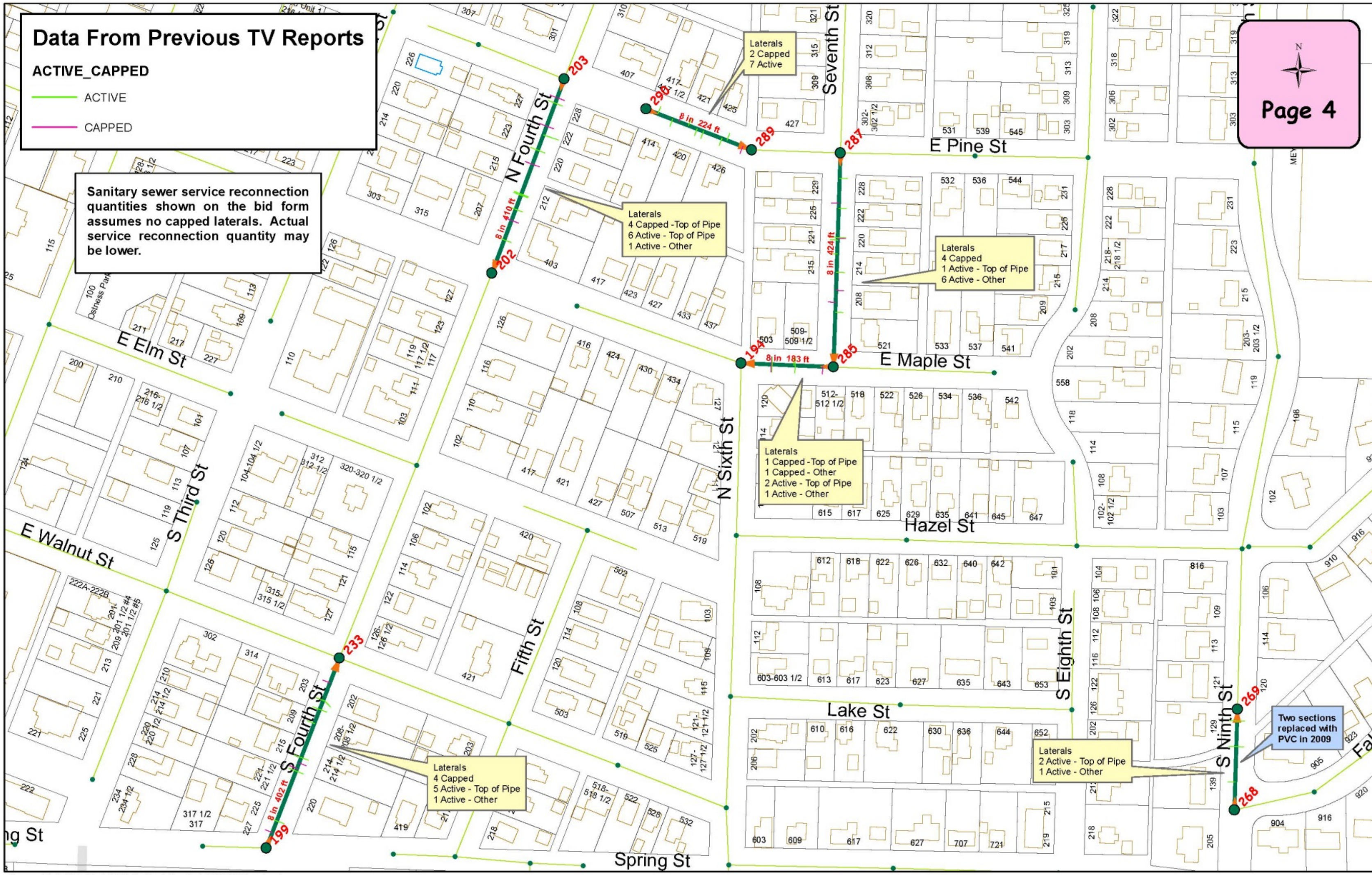
Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page1.mxd



Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page2.mxd

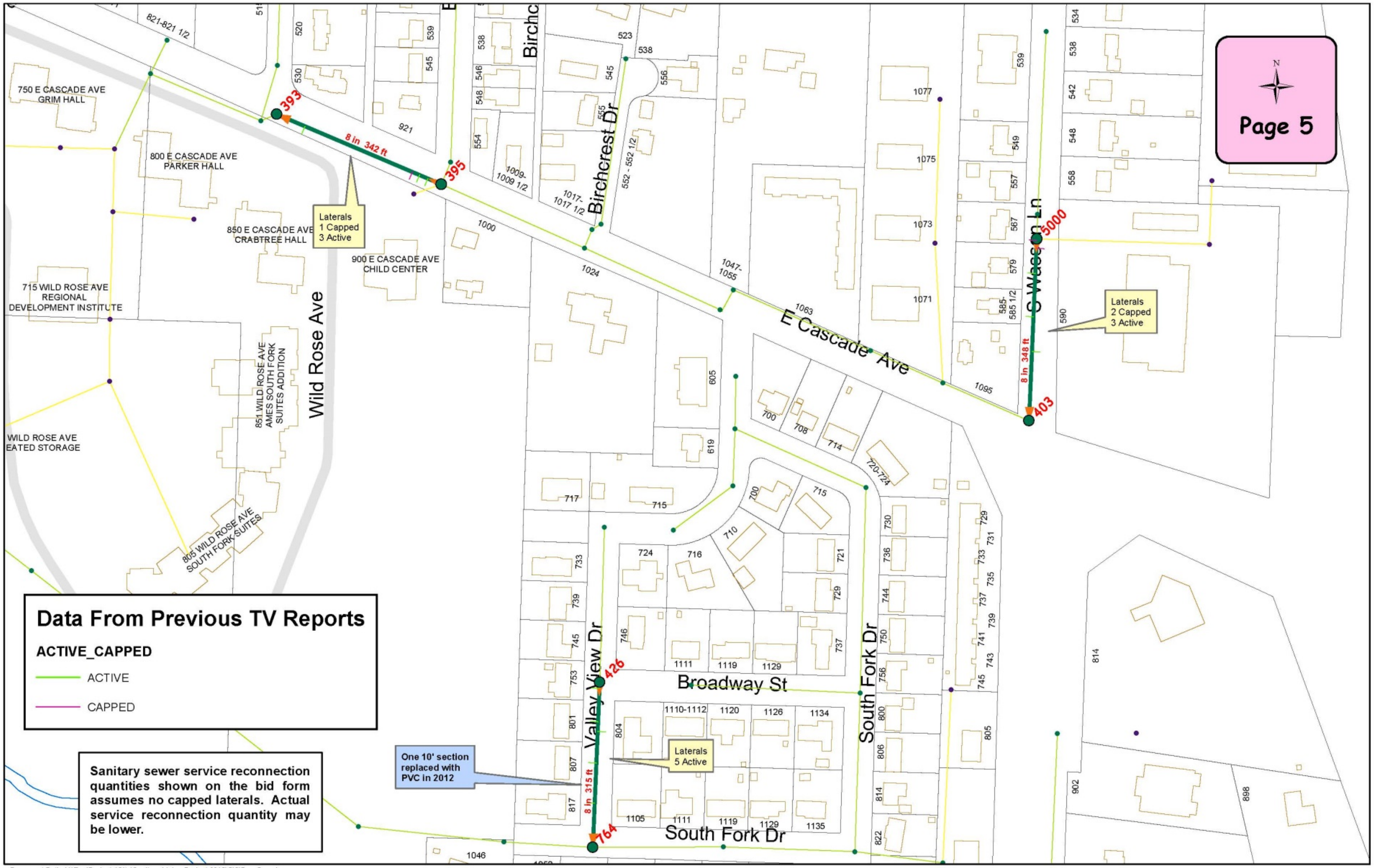


Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page3.mxd

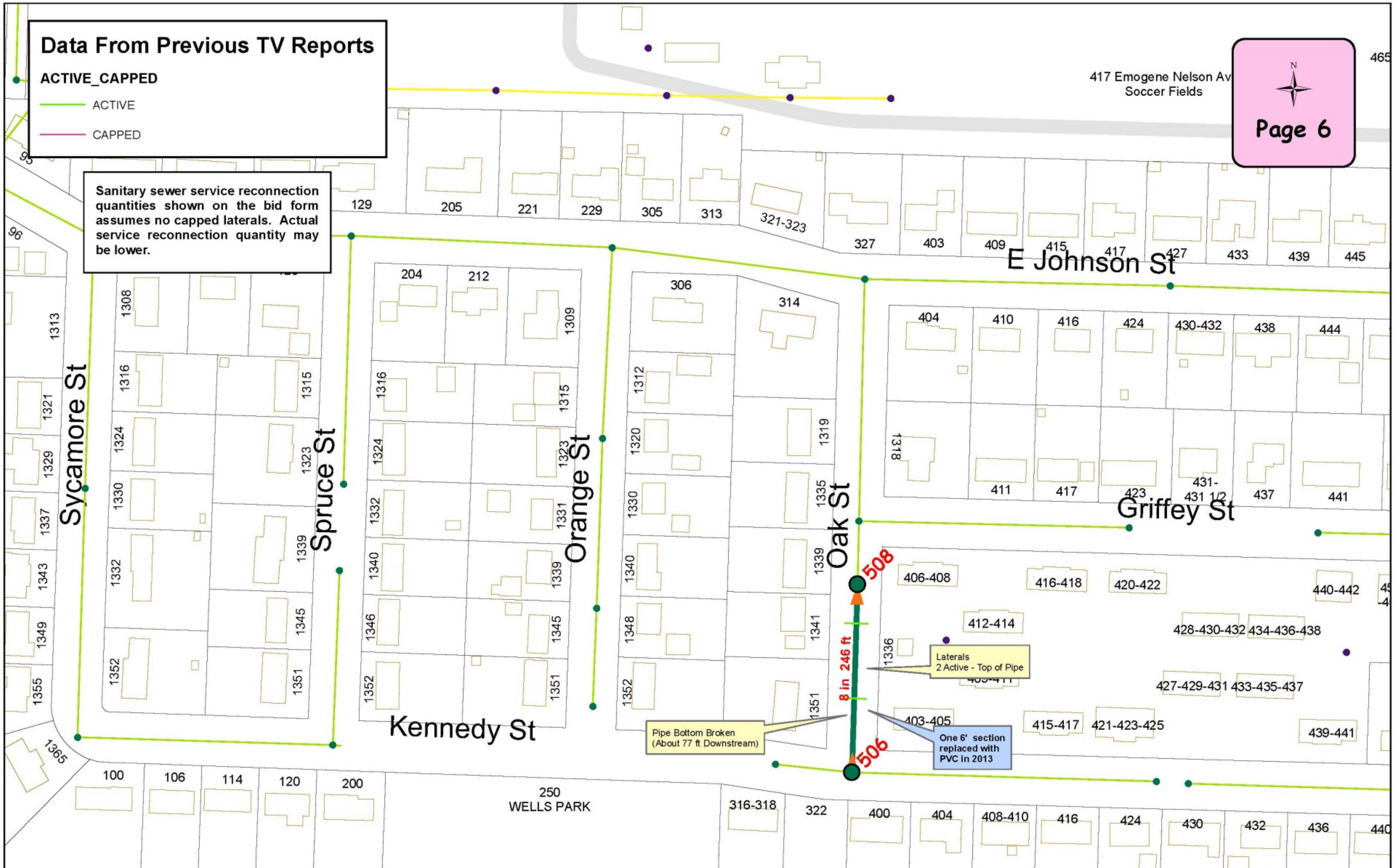


Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page4.mxd

City of River Falls



Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page5.mxd



Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page6.mxd

Summary of pipe footages and service laterals that need to be cut open:

- 8″ pipe = 4748 feet
- 18″ pipe = 284 feet (Lametti Interceptor Line)
- Total = 5032 feet (needing to be cleaned & televised)
- Service connections = 100 (includes capped laterals)

Lametti Line
Note Cracks

Lametti Line

8 Bids were received, with Insituform having the lowest bid.

	Base Bid Total
Engineers Estimate	$138,733.16
Insituform	$137,470.70
Terra Engineering & Construction	$139,654.00
Visu-Sewer Inc.	$141,734.00
Hydro-Klean, LLC	$146,535.32
Lametti & sons Inc.	$147,780.00
SAK Construction	$161,218.00
Michels Pipe Service	$161,917.00
Veit & Company	$163,676.00

Sanitary Sewer Statistics – March 2016

Pipe by Material	Ft.
Total Pipe Length	323,283.86
Length of DIP Pipe	2,171.25
Length of Cast Iron Pipe	3,007.96
Length of Pipe-Material Unk	2,686.51
Length of Clay Pipe	126,280.14
Length of PVC Pipe	169,954.87
Length of Lined Pipe	16,888.09

Number of Pipes	Count
Number of Sewer Pipes	1459
Number of DIP Pipes	12
Number of Cast Iron Pipes	12
Number of Pipes -Material Unk	22
Number of Clay Pipes	528
Number of PVC Pipes	823
Number of Lined Pipes	61

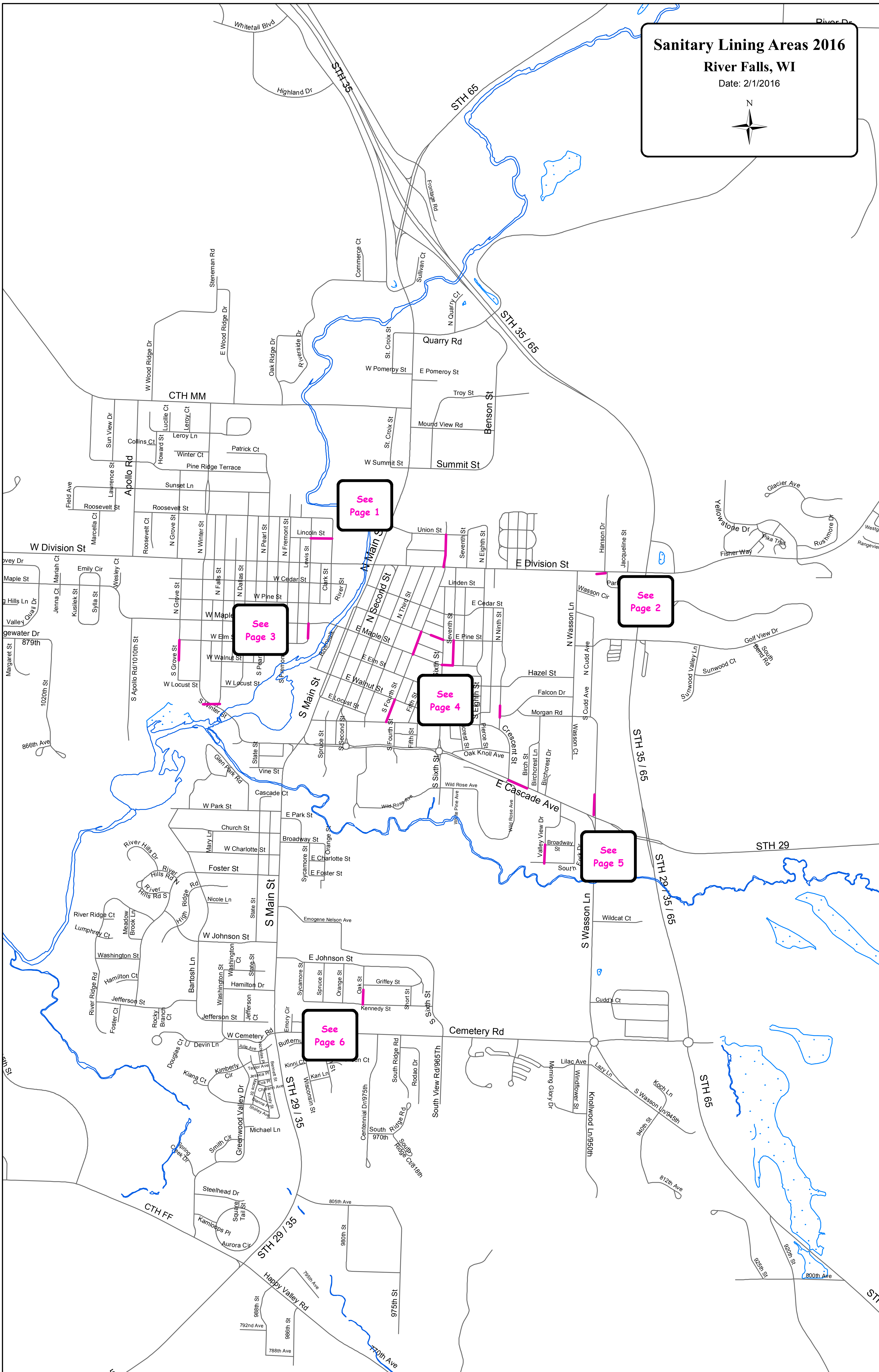
Percentage of Lined Pipe	%
Percent of Lined Pipe(Compared Total)	5.22%
Percent of Lined Pipe (Compared to Cast/Clay/Unknown Material)	11.34%

This 11.34 does not include the ne er areas of the city (ith P C pipe). It represents the older parts of to n.

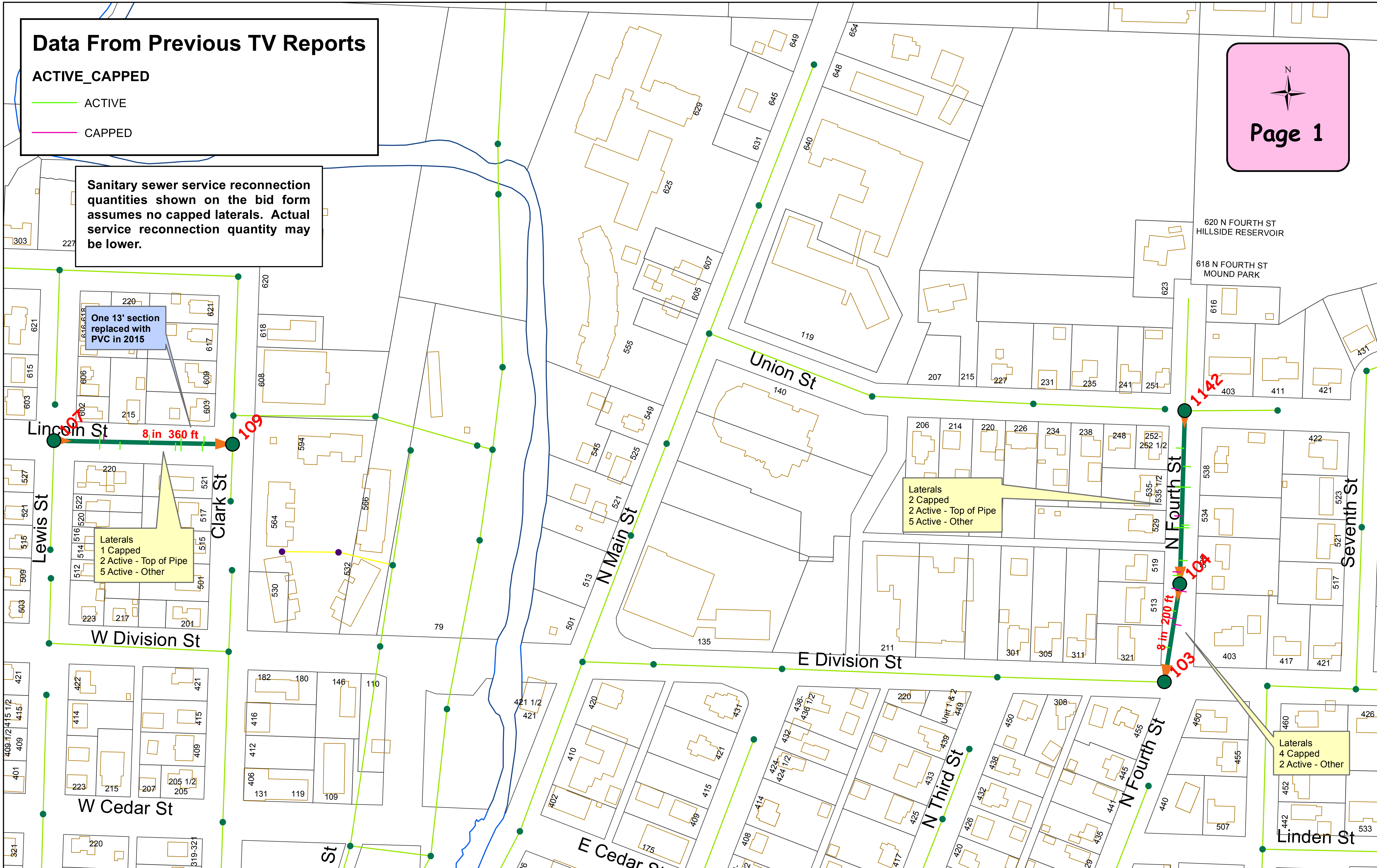
Sewer Pipes by Diameter – March – 2016

Pipe by Diameter	Ft.
Length of 4" Pipe	427
Length of 6" Pipe	12
Length of 8" Pipe	211,806
Length of 10" Pipe	38,530
Length of 12" Pipe	23,300
Length of 14" Pipe	2,686
Length of 15" Pipe	16,924
Length of 16" Pipe	399
Length of 18" Pipe	19,643
Length of 21" Pipe	1,361
Length of 24" Pipe	7,949
Pipe Length Unk	245

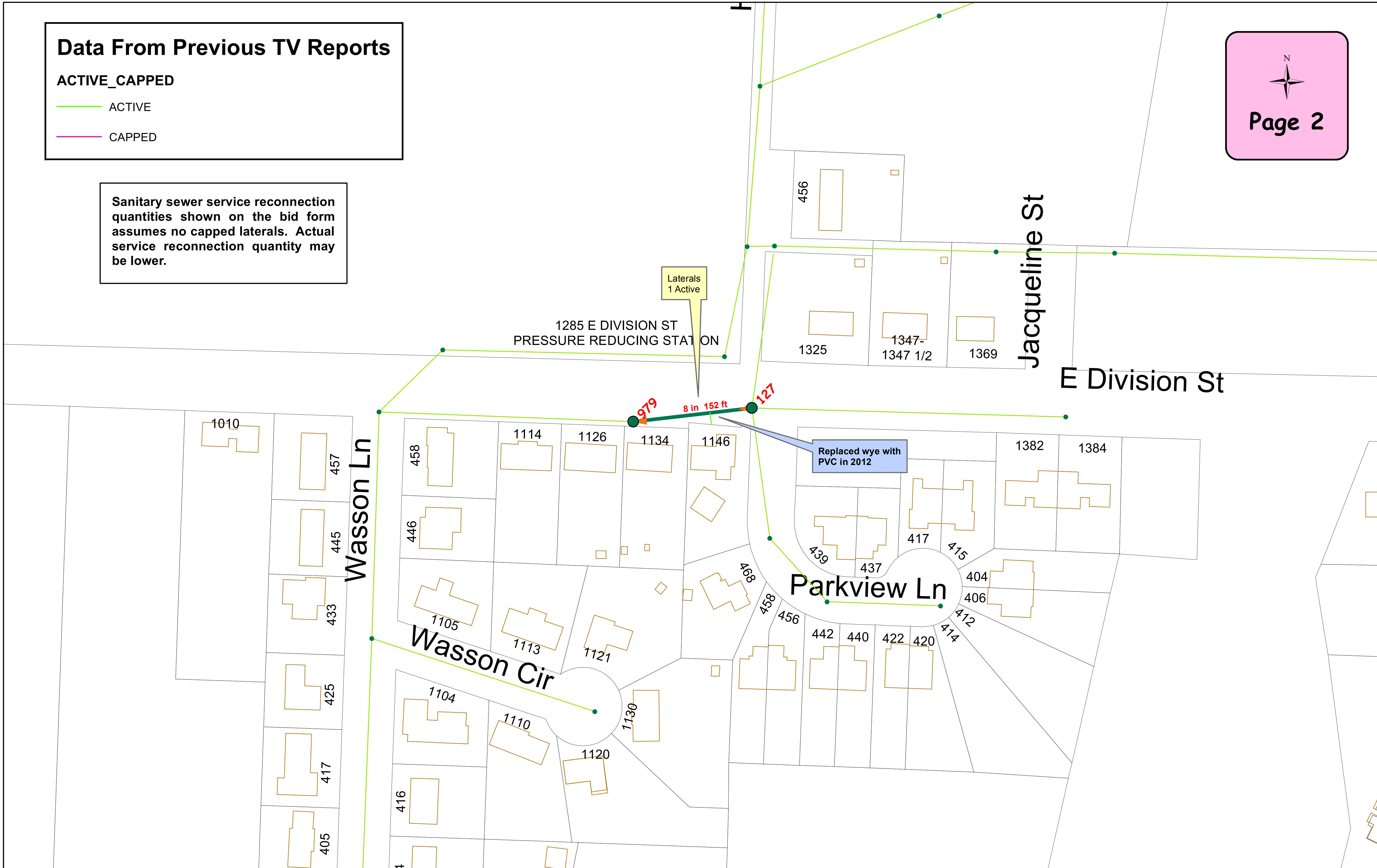
Questions?

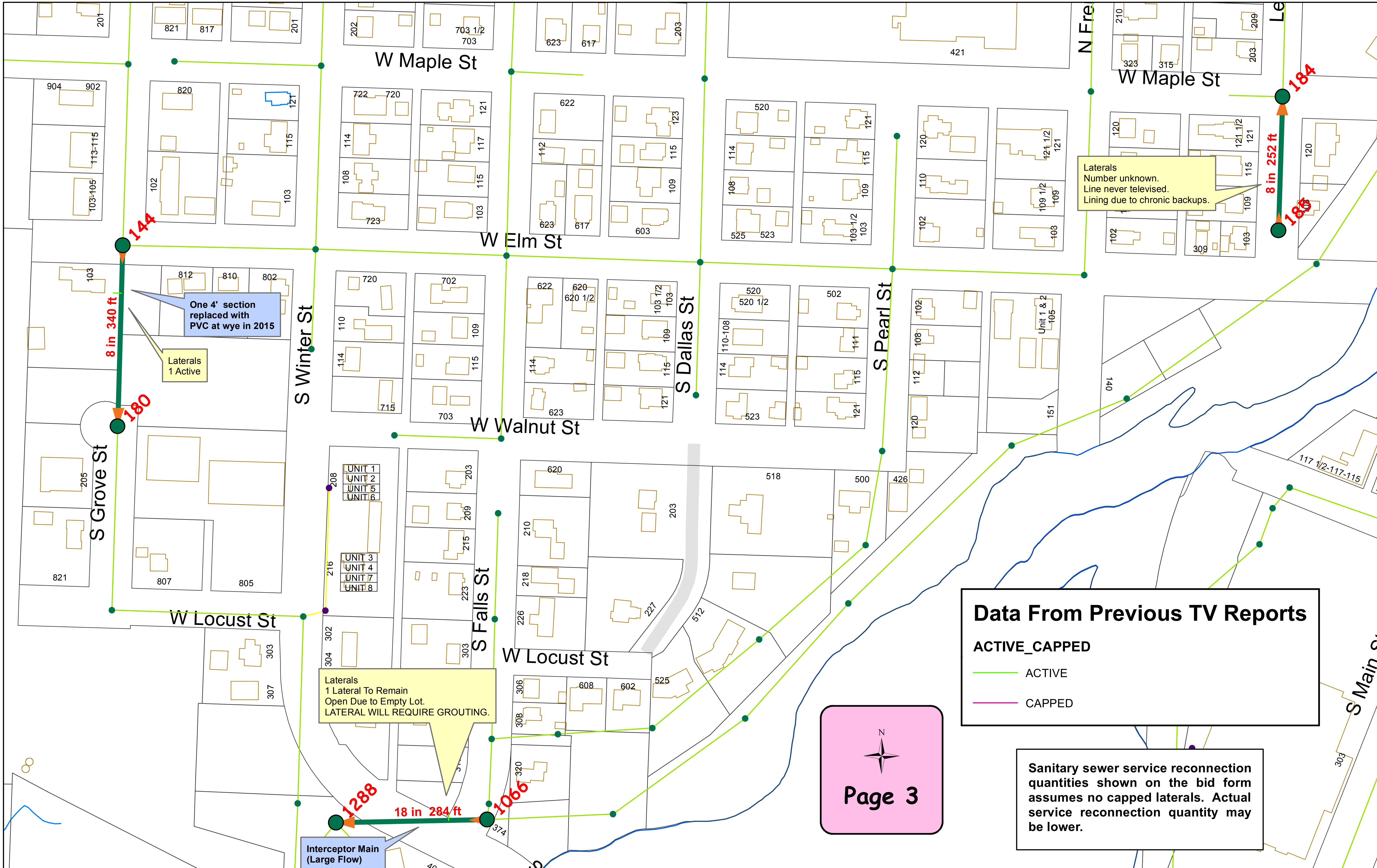


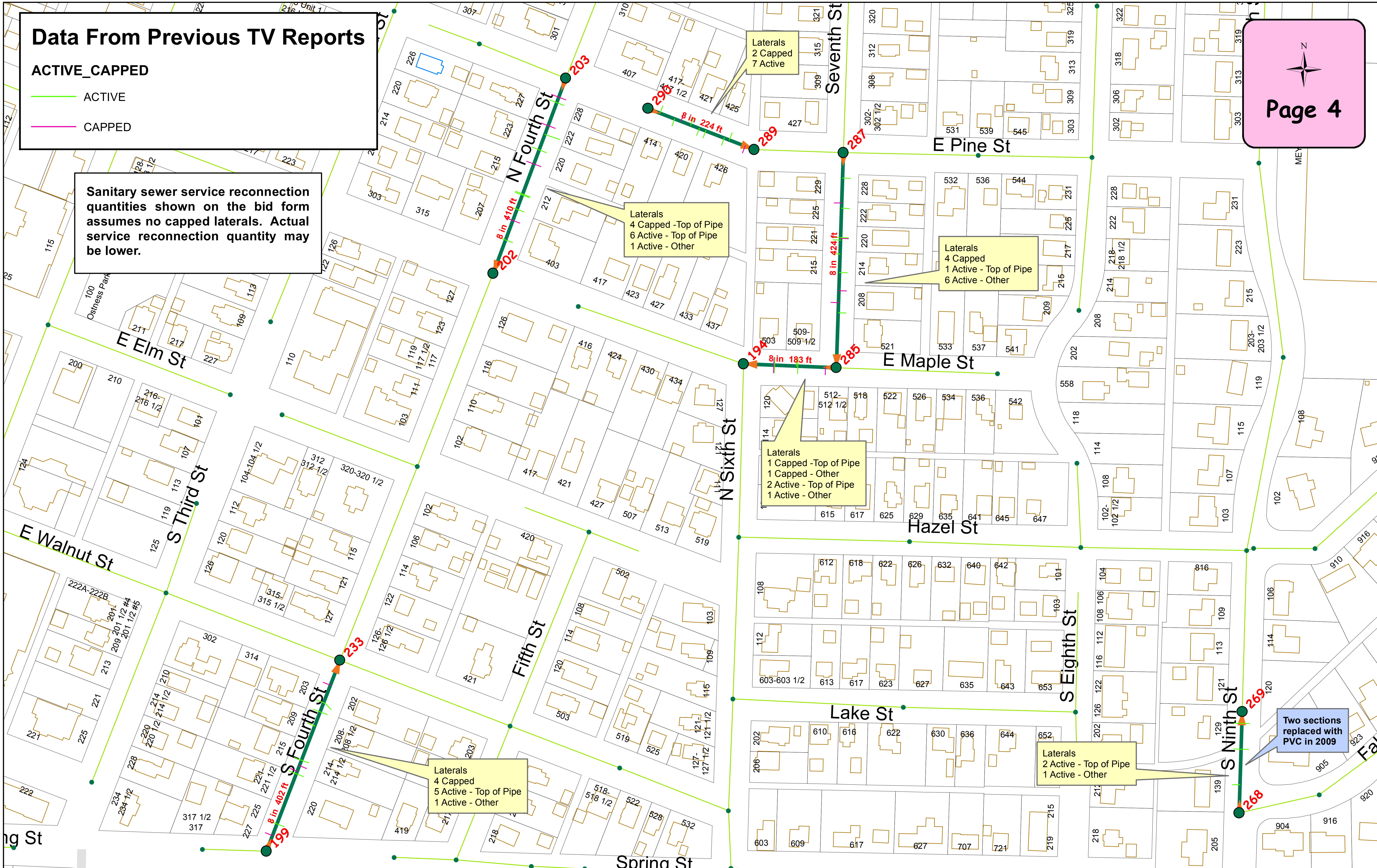
Sanitary Lining Areas 2016
River Falls, WI
Date: 2/1/2016
N
See Page 1
See Page 2
See Page 3
See Page 4
See Page 5
See Page 6
STH 35
STH 65
STH 35 / 65
STH 29
STH 29 / 35
CTH MM
CTH FF
W Division St
E Division St
N Main St
S Main St
E Cascade Ave
Cemetery Rd
Quarry Rd
Summit St
Apollo Rd
Benson St
S Wasson Ln
Whitetail Blvd
Highland Dr
Happy Valley Rd



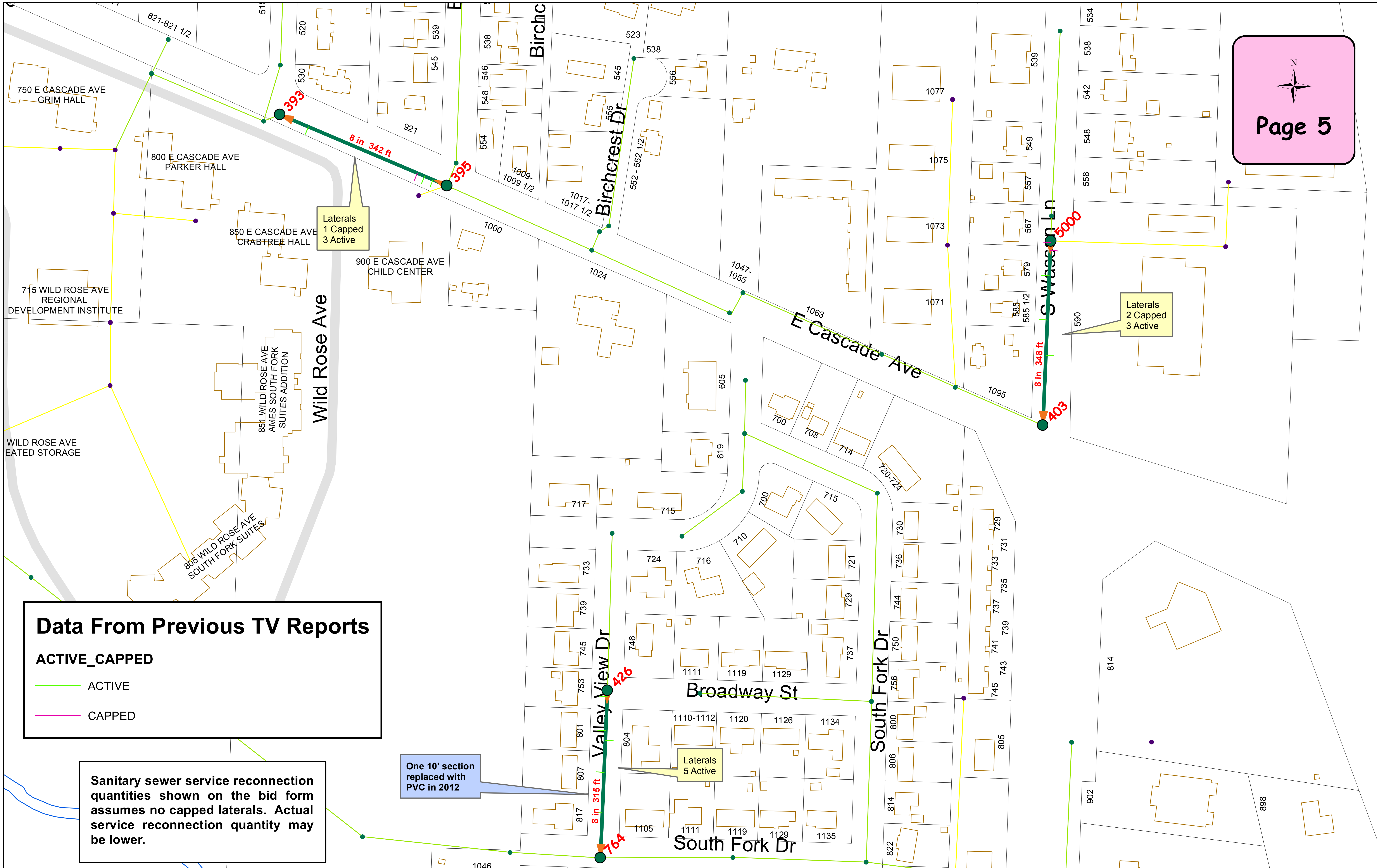
Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page1.mxd

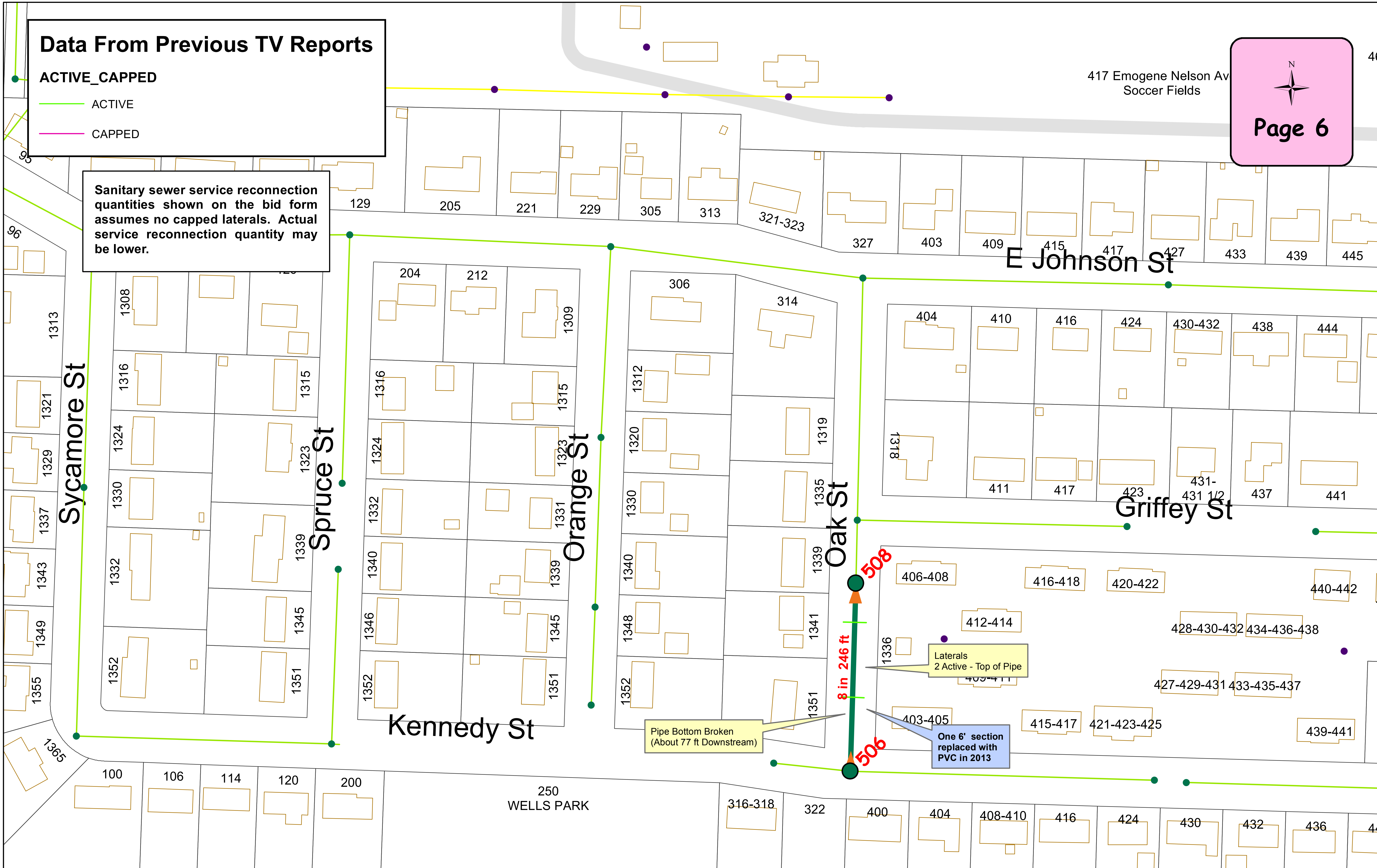

Data From Previous TV Reports
ACTIVE_CAPPED
ACTIVE
CAPPED
Sanitary sewer service reconnection quantities shown on the bid form assumes no capped laterals. Actual service reconnection quantity may be lower.
Page 2
N
Laterals
1 Active
1285 E DIVISION ST
PRESSURE REDUCING STATION
979
8 in 152 ft
127
Replaced wye with PVC in 2012
E Division St
Jacqueline St
Wasson Ln
Wasson Cir
Parkview Ln
1010
457
445
433
425
417
405
458
446
1114
1126
1134
1146
1105
1113
1121
1104
1110
1120
1130
416
456
1325
1347-
1347 1/2
1369
1382
1384
417
415
439
437
468
458
456
442
440
422
420
404
406
412
414


W Maple St
W Elm St
W Walnut St
W Locust St
S Grove St
S Winter St
S Dallas St
S Pearl St
S Falls St
S Main St
144
180
8 in 340 ft
One 4' section replaced with PVC at wye in 2015
Laterals
1 Active
184
185
8 in 252 ft
Laterals
Number unknown.
Line never televised.
Lining due to chronic backups.
1288
1066
18 in 284 ft
Interceptor Main
(Large Flow)
Laterals
1 Lateral To Remain
Open Due to Empty Lot.
LATERAL WILL REQUIRE GROUTING.
N
Page 3
Data From Previous TV Reports
ACTIVE_CAPPED
ACTIVE
CAPPED
Sanitary sewer reconnection quantities shown on the bid form assumes no capped laterals. Actual service reconnection quantity may be lower.



Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page4.mxd


Page 5
N
Data From Previous TV Reports
ACTIVE_CAPPED
ACTIVE
CAPPED
Sanitary sewer service reconnection quantities shown on the bid form assumes no capped laterals. Actual service reconnection quantity may be lower.
Laterals
1 Capped
3 Active
Laterals
2 Capped
3 Active
Laterals
5 Active
One 10' section replaced with PVC in 2012
393
395
8 in 342 ft
5000
403
8 in 348 ft
426
764
8 in 315 ft
E Cascade Ave
Wild Rose Ave
Birchcrest Dr
S Wasson Ln
Valley View Dr
Broadway St
South Fork Dr
750 E CASCADE AVE
GRIM HALL
800 E CASCADE AVE
PARKER HALL
850 E CASCADE AVE
CRABTREE HALL
900 E CASCADE AVE
CHILD CENTER
715 WILD ROSE AVE
REGIONAL
DEVELOPMENT INSTITUTE
851 WILD ROSE AVE
AMES SOUTH FORK
SUITES ADDITION
805 WILD ROSE AVE
SOUTH FORK SUITES
WILD ROSE AVE
EATED STORAGE



Document Path: V:\Eng\Projects\City\Sanitary Lining Project 2016\GIS\Page6.mxd

Sanitary Statistics – March 2016

Pipe by Material	Ft.
Total Pipe Length	323,283.86
Length of DIP Pipe	2,171.25
Length of Cast Iron Pipe	3,007.96
Length of Pipe-Material Unk	2,686.51
Length of Clay Pipe	126,280.14
Length of PVC Pipe	169,954.87
Length of Lined Pipe	16,888.09

Number of Pipes	Count
Number of Sewer Pipes	1459
Number of DIP Pipes	12
Number of Cast Iron Pipes	12
Number of Pipes -Material Unk	22
Number of Clay Pipes	528
Number of PVC Pipes	823
Number of Lined Pipes	61

Percentage of Lined Pipe	%
Percent of Lined Pipe(Compared to Total)	5.22%
Percent of Lined Pipe (Compared to Cast/Clay/Unknown Material)	11.34%

This 11.34% does not include the newer areas of the city (with PVC pipe). It represents the older parts of town.

Pipe by Diameter	Ft.
Length of 4" Pipe	427.28
Length of 6" Pipe	12.25
Length of 8" Pipe	211,806.13
Length of 10" Pipe	38,529.94
Length of 12" Pipe	23,299.65
Length of 14" Pipe	2,686.27
Length of 15" Pipe	16,924.32
Length of 16" Pipe	398.93
Length of 18" Pipe	19,643.46
Length of 21" Pipe	1,361.06
Length of 24" Pipe	7,949.14
Pipe Length Unk	245.45

RESOLUTION NO. 2016-06

RESOLUTION SUPPORTING BID AWARD FOR THE 2016 SANITARY SEWER LINING PROJECT

WHEREAS, with the cities aging collection system, a number of sanitary sewer mains are showing signs of deterioration; and

WHEREAS, the City of River Falls and River Falls Municipal Utilities have a desire to maintain the Sanitary Sewer Collection system; and

WHEREAS, eight proposals were received for the work identified to be in need of lining; and

WHEREAS, the 2016 Sewer Fund budget includes $160,000 in the sewer maintenance line item; and

WHEREAS, Insituform submitted the low proposal in the amount of $137,470.70 ; and

WHEREAS, staff has reviewed the proposal and finds it acceptable;

NOW, THEREFORE, BE IT RESOLVED that the City of River Falls Utility Advisory Board hereby accepts the proposal for lining from Insituform in the total amount of $137,470.70 and requests Common Council approve bid award for the 2016 Sanitary Sewer Lining Project.

Dated this 21st day of March, 2016

____
Grant Hanson, President

ATTEST:

____
Lu Ann Hecht, City Clerk

City of RIVER FALLS

#

MEMORANDUM

TO: Utility Advisory Board

FROM: Reid Wronski, P.E., City Engineer

DATE: March 21, 2016

TITLE: **Resolution Authorizing Professional Services for North Interceptor Sewer Project.**

RECOMMENDED ACTION

Adopt resolution recommending that the City Council enter into an agreement with TKDA for professional services necessary to complete initial work for the North Interceptor Sewer Project.

BACKGROUND

On November 16, 2015, staff presented a draft Request for Proposals to the Utility Advisory Board and laid out a plan for proceeding forward with necessary planning of a North Interceptor Sewer project.

On December 1, 2015, a Request for Proposals was e-mailed to the following five firms:

1. Ayres
2. MSA
3. SEH
4. Strand
5. TKDA

On December 17, 2015, a pre-proposal meeting was conducted at City Hall to offer an opportunity for prospective consulting firms to seek clarification to questions regarding the RFP

On January 15, 2016, staff issued a revision to the RFP adding additional scope of work to address coordination of sewer interceptor issues with upcoming substation and trail projects. The due date for proposals was extended from January 20, 2016 to February 3, 2016.

DISCUSSION

On February 3, 2016, staff received proposals from MSA, SEH, and TDKA. Proposals were forward to the following selection committee members:

1. Reid Wronski, City Engineer
2. Kevin Westhuis, Utility Director
3. Diane Odeen, City Council
4. Chris Gagne, Utility Advisory Board
5. Ron Groth, Waste Water and Water Superintendent

On February 23, 2016, the selection committee met. The five members discussed various aspects of the three proposals received.

All five members felt that TKDA and SEH were the two strongest proposals. General consensus was to focus our discussion on TKDA vs SEH.

The RFP identified those significant areas of consideration in evaluating the proposals would be:

Demonstrated understanding of the proposed work

Both SEH and TKDA demonstrated good understanding of the proposed work. Each took a close look at data provided them and identified that there was limited slope available for new interceptor routing options. TKDA further identified that if we go downstream one manhole to begin the new north interceptor, significant addition grade is obtained that may allow more and better routing options to be considered.

Key personnel and roles, especially their direct experience of those involved

SEH's proposed project manager listed minimal experiences as a project manager and only one example related to the type of work proposed in the N Interceptor project.

TKDA's proposed Project Manager has 33 years' experience. TKDA's proposed Project Manager lists extensive project management experience involving many projects related to the type of work proposed in the N Interceptor project.

Team with ability to deliver successful project.

Both SEH and TKDA identified key technical expertise necessary to deliver a successful project. TKDA offered a fully-integrated team working out of the same office with a dedicated wastewater department. There was general consensus that TKDA's proposed process for land acquisition was clearer and provided personnel with better directly related experience to our project. SEH offers a team with more experience in Wisconsin than TKDA.

Suggested additions to the scope that reflect positively of the firms approach and methodology.

SEH's proposal provided information on various options that the City may have available for project funding as the project progresses. Some of the options such as financing through TID districts have already been brought into play through previous City actions.

Proposed Fees

There was no significant difference in the proposed fees put forth for this work. However, we were unable to fully understand the wide range in fees from SEH for the fairly well defined scope of work that will occur in the following areas.

Description	TKDA	SEH
N Interceptor Routing Study	$45,300	$63,000-$106,000
St. Croix Street Outfall Study	$47,000	$39,000-$64,000
Downstream Preliminary Design	$39,800	$43,000-$128,000

Consultant Recommendation

SEH was viewed as a qualified known firm with familiar personnel. TKDA's Project Manager's experience and their real estate acquisition team caused the committee to recommend TKDA so long as a due diligence background check did not reveal concerns. Staff conducted an internet search looking for current or recent turmoil involving TKDA projects. None was found. Staff also contacted an interceptor sewer contractor, municipality and a Metropolitan Council engineer, all familiar with both firms; to seek any information that would negatively affect our recommendation. None were offered.

TKDA Contract for Services

TKDA has provided staff with an initial scope of work supplement outlining those well identified tasks that recommends engaging in at the moment. Those Tasks are:

N. Interceptor Routing Study (estimated fee $45,300)

The purpose of this study is to determine a route for a new 21" sewer interceptor line that would replace the existing north side lift station and forcemain with a gravity flow sewer. The new interceptor sewer would discharge into an existing or rebuilt gravity sewer manhole located in the current St. Croix Street Outfall Pond or another manhole downstream of that one.

Milestone	Date
Present Routes to the City[1]	August 15
Provide Easement Map to the City[2]	September 27
Draft Report to City	October 14
Final Report to City	October 31

[1] Utility Advisor Board Meeting

[2] City Council

St. Croix Street Outfall Study (estimated fee $48,800)

The purpose of this study is to create a concept plan for expansion and rehabilitation of the St. Croix Street Outfall Pond in order for the pond to provide rate control and sediment treatment consistent with current standards and be coordinated with the plans for the North Interceptor.

Note: Staff requested TKDA include additional meetings with WisDNR in their scope of work causing the estimate to be $1,800 more than their original proposed amount.

Milestone	Date
Provide Concept Plans to City[1]	August 15
Provide Preliminary Plan & Cost Estimate to City[2]	September 27
Draft Report to City	October 14
Final Report to City	October 31

[1] Utility Advisory Board Meeting
[2] City Council

Downstream Interceptor Planning And Preliminary Design (estimated fee $39,800)
The purpose of this work will be to determine the routing and alignment associated with the eventual upsizing of the North Interceptor south of the St. Croix Street Outfall as identified in the 2009 Sanitary Sewer Collection System Study. This will allow better coordination with the upcoming substation project and the Heritage Park to Division Street trail project.

Milestone	Date
Provide Recommended Route to City[1]	July 18
Provide Preliminary Design to City	September 15
Draft Report to City	September 30
Final Report to City	October 17

[1] Utility Advisory Board Meeting

Land Acquisition (estimated fee $14,500)
The purpose of this work will be to get a head start on land acquisition that will ultimately be necessary once the above noted studies are complete and provide some up front outreach to parties that may be affected by the project. Key work included at this time includes:

- Research Public Records
- Contact landowners to provide a preliminary overview of the project and request permission to access the property for engineering and surveying purposes
- Survey existing property monuments in the area
- Market study to aid in the budget forecast.

Milestone dates are provided with the assumption that written authorization to proceed is received by March 23, 2016 and access granted by May 2, 2016.

FINANCIAL CONSIDERATIONS
The fee summary for this authorization is as follows:

North Sanitary Sewer Interceptor Routing Study	$45,300
St. Croix Street Outfall Study	$48,800
Downstream Interceptor Planning And Preliminary Design	$39,800
Land Acquisition	$22,000
Subtotal	$155,900

CONCLUSION
Staff recommends approval of the attached resolution recommending that the City Council enter into an agreement with TKDA for professional services necessary to complete initial work for the North Interceptor Sewer Project.

City of River Falls

RESOLUTION NO. 2016-07

RESOLUTION AUTHORIZING PROFESSIONAL SERVICES FOR NORTH INTERCEPTOR SEWER PROJECT.

WHEREAS, On November 16, 2015, staff presented a draft Request for Proposals to the Utility Advisory Board and laid out a plan for proceeding forward with necessary planning of a North Interceptor Sewer project; and

WHEREAS, On December 1, 2015, a Request for Proposals was e-mailed to the following five firms; and

WHEREAS, On February 3, 2016, staff received proposals from MSA, SEH, and TDKA; and

WHEREAS, On February 23, 2016, the selection committee met and discussed various aspects of the three proposals received; and

WHEREAS, the consensus of the committee was to recommend TKDA; and

WHEREAS, TKDA has provided staff with an initial scope of work supplement outlining those well identified tasks that the City would like to initially engage TKDA in; and

WHEREAS, staff recommends authorizing TKDA for up to $155,900in professional services necessary to support timely and logical advancement of this project.

NOW, THEREFORE, BE IT RESOLVED that the Utility Advisory Board of the City of River Falls hereby recommends that the City Council authorize the City Administrator to enter into an agreement with TKDA for professional services necessary to complete initial work for the North Interceptor Sewer Project for an amount not to exceed $155,900.

Dated this 21st day of March, 2016.

____

Grant Hanson, Board President

ATTEST:

____

Lu Ann Hecht, City Clerk

March 16, 2016

To: Utility Advisory Board

From: Tracy Biederman, Accountant

Re: **February 2016** Financial Statements

Attached are the interim financial statements for the electric, water and sewer funds for the period ending February 2016.

Electric fund: Total revenue for the electric fund is $2,389,136. Year to date total expenses are $2,149,885; generating a net income decrease of $46,568 over the last year.

- Cumulative reductions occurred in purchased power and transmission expenditures.
  - Purchased Power kWh was 3,046,935 in 2015 compared to 2,873,425 in 2016 for the two periods reporting.
  - Transmission decreased due to the Overhead line clearing that occurred in 2015 with no billed activity in 2016.
- The increase in Hydraulic Power generation is due to the final payment of the 2015 sediment survey services performed by Inter-Fluve Inc..
- Period ending cash and unrestricted investments balance is a positive $7.261 million.

Overall the Electric Utility has a net gain of $239,251. The utility's other financing sources/(uses) is reduced due to the Power Plant Buyout from WPPI was completed in 2015. Whereas the Net Book Value of the assets will still be recognized until November 2016.

Water fund: Total revenue for the water fund is $255,868. Year to date total expenses are $266,809.

- Water consumption increased 7.9% from last year in all class categories; an increase of 3.88 million gallons.
- Expenditures for the period ending are very consistent to the prior years'.
- Period ending cash and unrestricted investments balance is a positive $1.188 million.

The current period experienced a positive gain of $5,016 with a two-month cumulative total at a negative loss of $10,945.

Sewer fund: Total revenue for the sewer fund is $546,406. Year to date total expenses are $328,904.

- Plant maintenance and BioSolids have recognized a decline in expenditures year-over-year.
- Revenues for services have increased due to the increase in water consumption.
- Period ending cash and unrestricted investments balance is a positive $2.131 million.

The Utility has an overall net gain of $445,808.

Please contact me if you have any questions regarding the monthly financial reports.

City of River Falls

Financial Statement
February 2016

	Current ear				
	Budget	onth	-T-D	Budgeted	Prior -T-D
610 - Electric					
Revenue					
Charges for Services	$14,189,533	$1,235,596	$2,380,818	17%	$2,417,827
Interest	$15,000	$3,098	$5,535	37%	$7,157
Miscellaneous	$622,488	$25,091	$51,682	8%	$42,467
Other Financing	$30,000	$(23,717)	$(48,899)	(163)%	$37,871
Deferred Resources	$0	$0	$0	0%	$0
Total Revenue	**14,857,021**	**1,240,069**	**2,389,136**	**16**	**2,505,322**
E pense					
Hydraulic Power Generation	$32,569	$23,452	$24,563	75%	$7,914
Purchased Power	$10,866,597	$776,898	$1,628,706	15%	$1,703,567
Transmission	$25,997	$0	$1,617	6%	$26,009
Distribution	$1,106,753	$71,397	$127,622	12%	$127,751
Customer Accounts	$621,039	$39,143	$72,891	12%	$61,475
Administrative & General	$394,911	$24,258	$46,458	12%	$58,220
Other Operating Expenses	$764,700	$67,560	$135,121	18%	$128,684
Debt Service	$277,008	$0	$0	0%	$0
Transfers to Other Funds	$767,447	$56,454	$112,908	15%	$105,883
Total E pense	**14,857,021**	**1,059,161**	**2,149,885**	**14**	**2,219,503**
Net Total 610 - Electric	**0**	**180,907**	**239,251**	**15**	**285,819**

Financial Statement
February 2016

	Current ear				
	Budget	onth	-T-D	Budgeted	Prior -T-D
620 - Water					
Revenue					
Special Assessments	$0	$0	$0	0%	$0
Charges for Services	$1,313,137	$110,412	$215,550	16%	$208,028
Interest	$3,474	$657	$1,198	34%	$331
Miscellaneous	$459,145	$21,048	$27,986	6%	$16,470
Other Financing	$85,080	$8,904	$11,130	13%	$0
Total Revenue	**1,860,836**	**141,020**	**255,865**	**14**	**224,828**
E pense					
Transmission	$437,754	$22,935	$44,963	10%	$53,451
Pumping	$139,492	$11,553	$20,613	15%	$19,222
Water Treatment	$75,901	$3,812	$7,810	10%	$14,809
Customer Accounts	$117,111	$5,438	$10,162	9%	$9,419
Administrative & General	$187,321	$13,777	$26,280	14%	$21,254
Other Operating Expenses	$365,844	$37,035	$74,071	20%	$73,552
Debt Service	$66,119	$5,514	$11,028	17%	$11,932
Transfers to Other Funds	$471,294	$35,941	$71,882	15%	$66,907
Total E pense	**1,860,836**	**136,005**	**266,809**	**14**	**270,546**
Net Total 620 - Water	**0**	**5,016**	**(10,945)**	**14**	**(45,718)**

Financial Statement
February 2016

	Current ear				
	Budget	onth	-T-D	Budgeted	Prior -T-D
630 - Waste Water					
Revenue					
Special Assessments	$0	$0	$0	0%	$0
Charges for Services	$3,079,754	$283,712	$528,392	17%	$498,868
Interest	$4,500	$1,259	$2,233	50%	$2,020
Miscellaneous	$36,614	$4,299	$7,965	22%	$4,852
Other Financing	$59,480	$6,252	$7,815	13%	$0
Total Revenue	**3,180,348**	**295,523**	**546,406**	**17**	**505,739**
E pense					
Operation	$529,477	$30,634	$57,546	11%	$53,225
Maintenance	$558,637	$8,209	$25,842	5%	$32,333
Bio Solids	$394,000	$26,821	$49,864	13%	$66,440
Customer Accounts	$285,187	$5,749	$10,636	4%	$9,086
Administrative & General	$360,773	$24,835	$44,589	12%	$40,020
Other Operating Expenses	$493,000	$43,387	$86,774	18%	$86,591
Debt Service	$99,737	$11,664	$23,329	23%	$27,252
Transfers to Other Funds	$459,537	$15,162	$30,324	7%	$30,324
Total E pense	**3,180,348**	**166,461**	**328,904**	**10**	**345,272**
Net Total 630 - Waste Water	**0**	**129,062**	**217,501**	**14**	**160,467**
rand Total	**0**	**314,985**	**445,808**	**15**	**331,548**

Balance Sheet
Period ending February 2016

FUND	Description		Period Net Change	Account Balance
610 Electric				
Assets		Total Assets	133,265.04	20,943,558.82
	Cash and Investments		74,770.08	7,389,577.33
	Accounts Receivable		101,406.58	1,414,251.40
	Prepaid & Inventory		1,703.32	527,647.16
	Construction in Progress		22,945.53	133,454.90
	Capital Assets		0.00	24,375,614.32
	A/D Capital Assets		(67,560.47)	(12,896,986.29)
Liabilities		Total Liabilities	47,642.32	(926,507.28)
	Accounts Payable		52,165.48	(963,579.48)
	Non-Current Liability		19,845.00	(82,421.28)
	Debt Outstanding		814.47	(107,149.19)
	Deferred Resources		(25,182.63)	226,642.67
Fund Balance		Total Fund Balance	(180,907.36)	(20,017,051.54)
	Fund Balance		(180,907.36)	(20,017,051.54)
		Total Liabilities + Fund Balance	(133,265.04)	(20,943,558.82)

Balance Sheet
Period ending February 2016

FUND	Description		Period Net Change	Account Balance
620 Water				
Assets		Total Assets	(14,195.75)	15,606,821.25
	Cash and Investments		10,036.38	1,440,785.17
	Accounts Receivable		8,005.78	130,209.59
	Prepaid & Inventory		4,740.00	48,799.23
	Non-Current Assets		57.41	337,364.39
	Constr in Progress		0.00	94,354.41
	Capital Assets		0.00	18,890,768.55
	A/D Capital Assets		(37,035.32)	(5,335,460.09)
Liabilities		Total Liabilities	19,211.47	(1,983,305.88)
	Accounts Payable		24,725.57	(29,444.59)
	Non-Current Liab		14.86	(34,008.34)
	Debt Outstanding		(5,528.96)	(1,919,852.95)
Fund Balance		Total Fund Balance	(5,015.72)	(13,623,515.37)
	Fund Balance		(5,015.72)	(13,623,515.37)
		Total Liabilities + Fund Balance	14,195.75	(15,606,821.25)

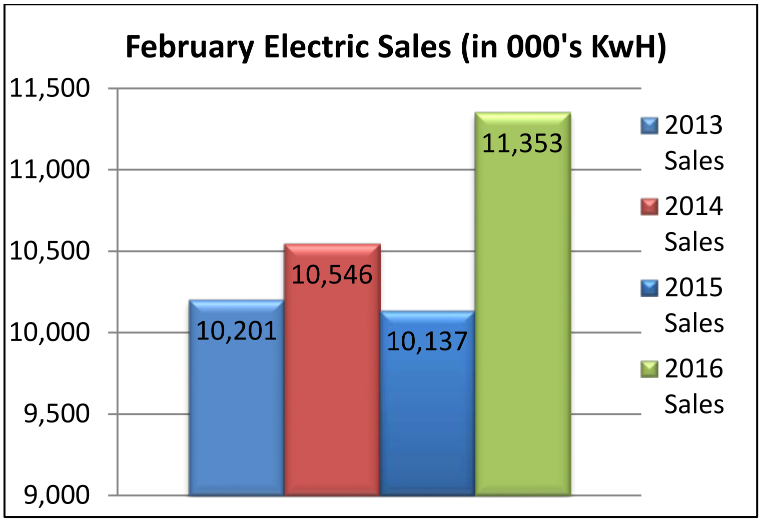
Balance Sheet
Period ending February 2016

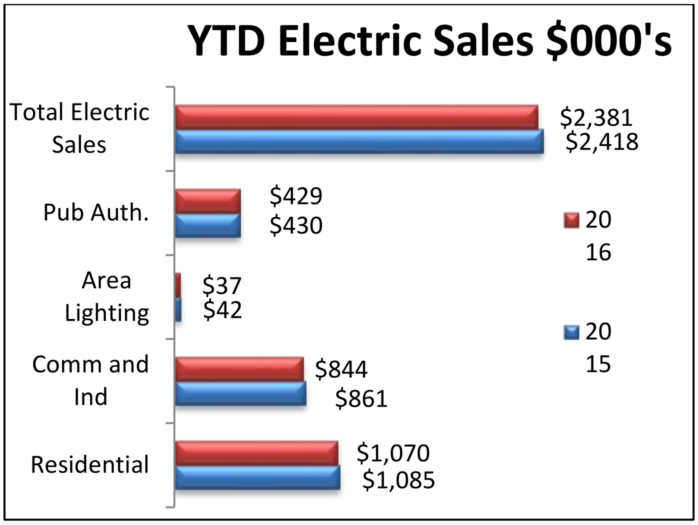
FUND	Description		Period Net Change	Account Balance
630 Waste Water				
Assets		Total Assets	125,455.08	23,149,382.19
	Cash and Investments		134,898.66	3,335,672.61
	Accounts Receivable		36,434.74	351,799.41
	Prepaid & Inventory		(2,619.58)	36,840.92
	Non-Current Assets		128.35	410,777.92
	Constr in Progress		0.00	357,946.99
	Capital Assets		0.00	27,810,248.54
	A/D Capital Assets		(43,387.09)	(9,153,904.20)
Liabilities		Total Liabilities	3,606.55	(5,644,773.65)
	Accounts Payable		15,271.04	(66,977.06)
	Non-Current Liab		1,491.68	(128,213.83)
	Debt Outstanding		(11,142.56)	(5,620,076.31)
	Deferred Resources		(2,013.61)	170,493.55
Fund Balance		Total Fund Balance	(129,061.63)	(17,504,608.54)
	Fund Balance		(129,061.63)	(17,504,608.54)
		Total Liabilities + Fund Balance	(125,455.08)	(23,149,382.19)

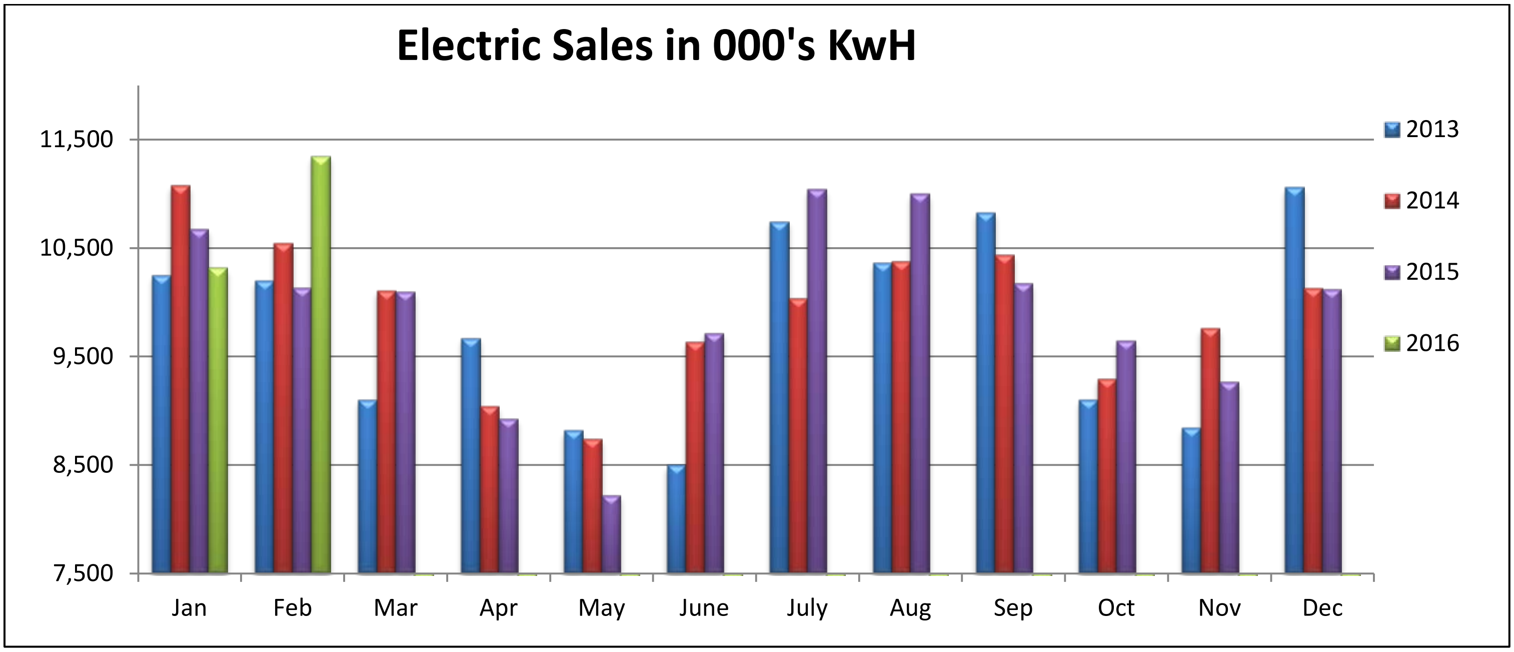
River Falls Municipal Utility
Electric Dashboard

For February 2016

Electric Sales



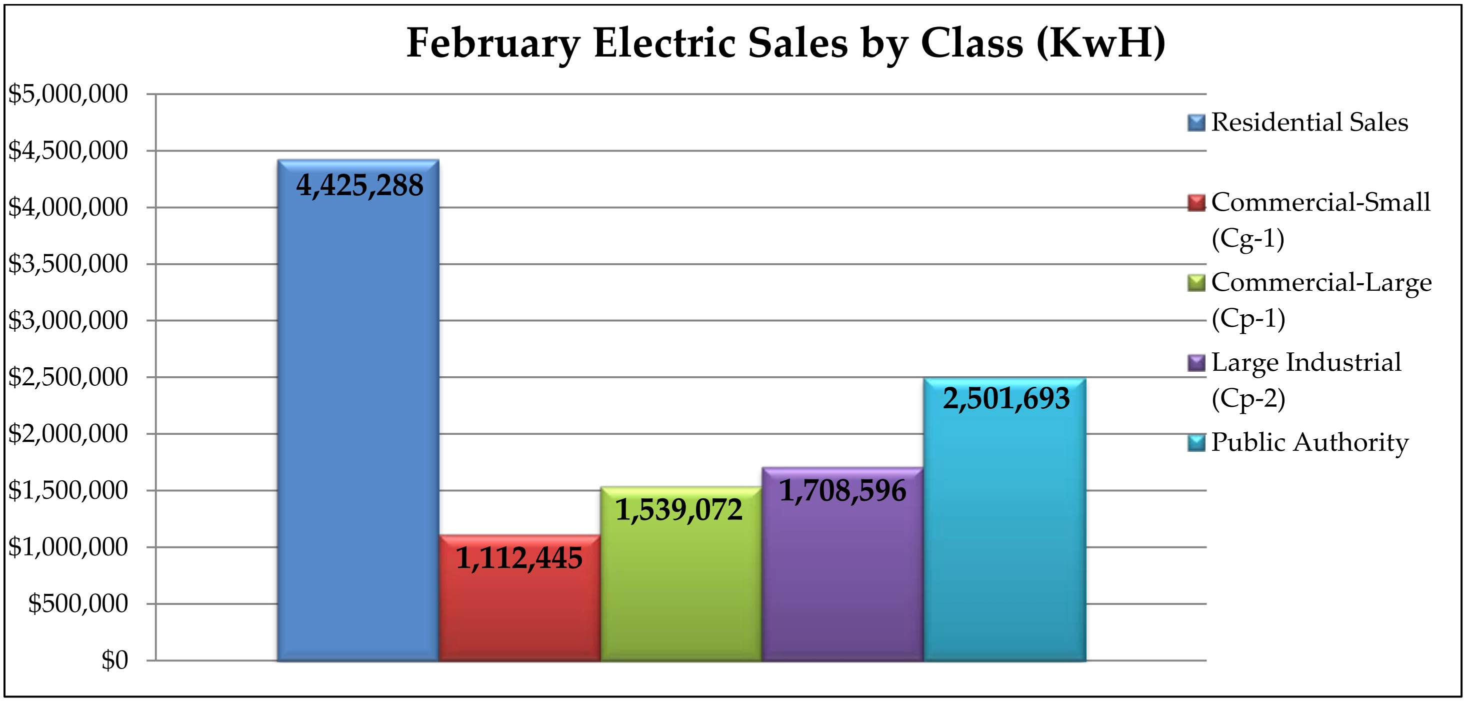




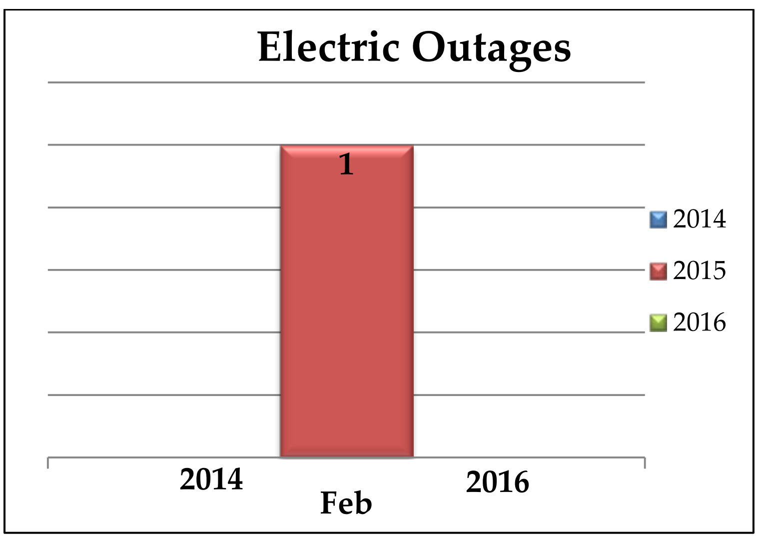
The Power of Community

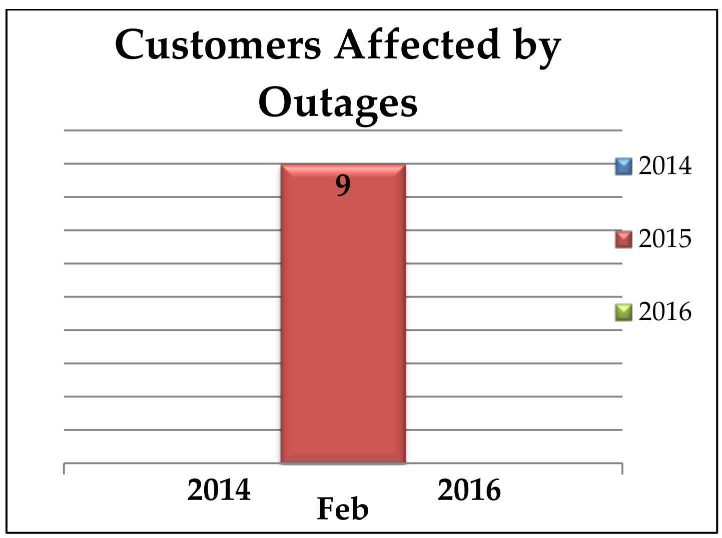
River Falls Municipal Utility
Electric Dashboard

For February 2016



Electric Outages



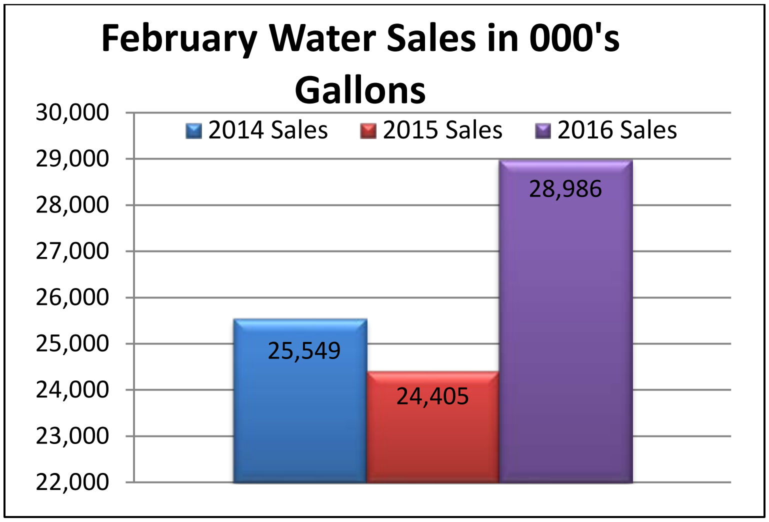


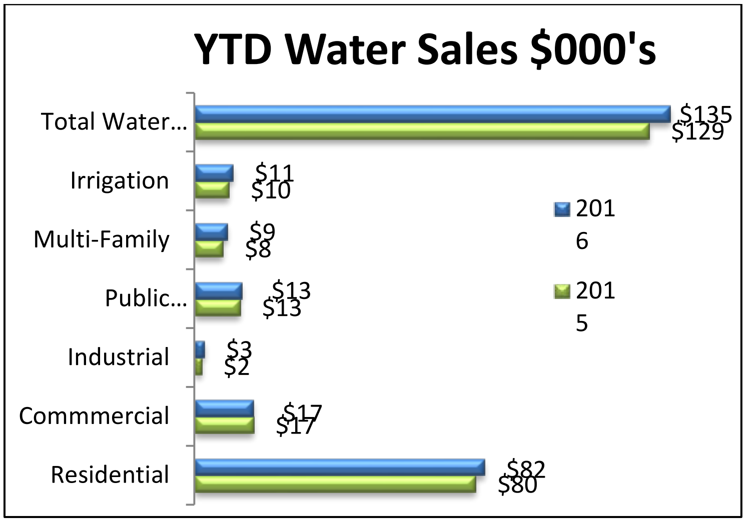
For more information please contact: Kevin Westhuis
(715) 426-3442 or kwesthuis@rfcity.org

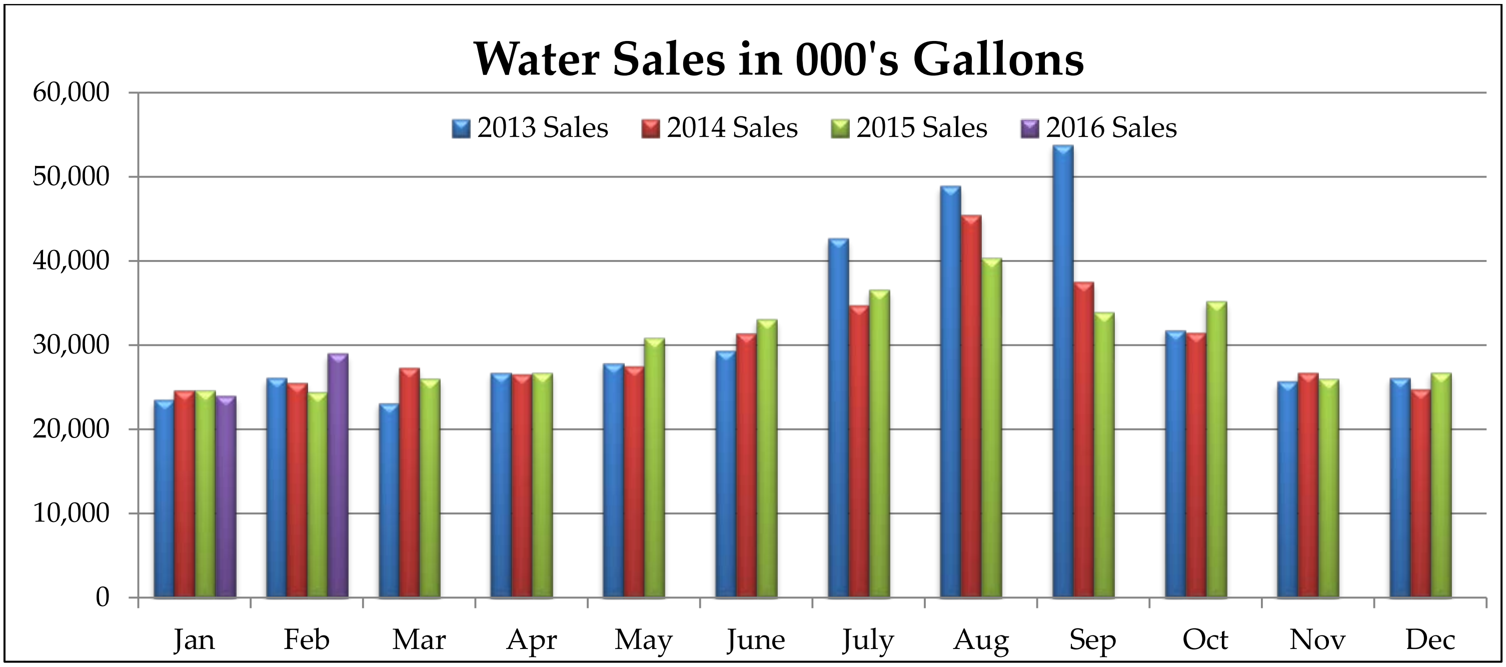
River Falls Municipal Utility
Water Dashboard

For February 2016

Water Sales





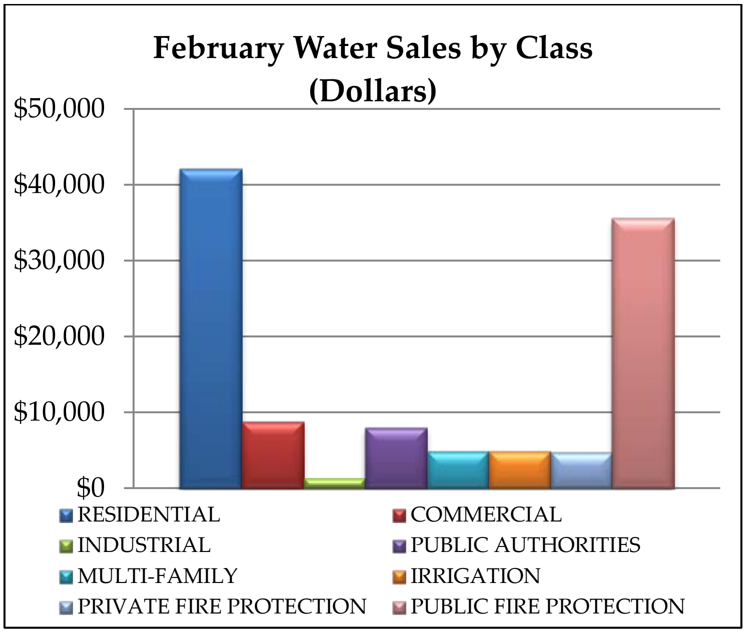


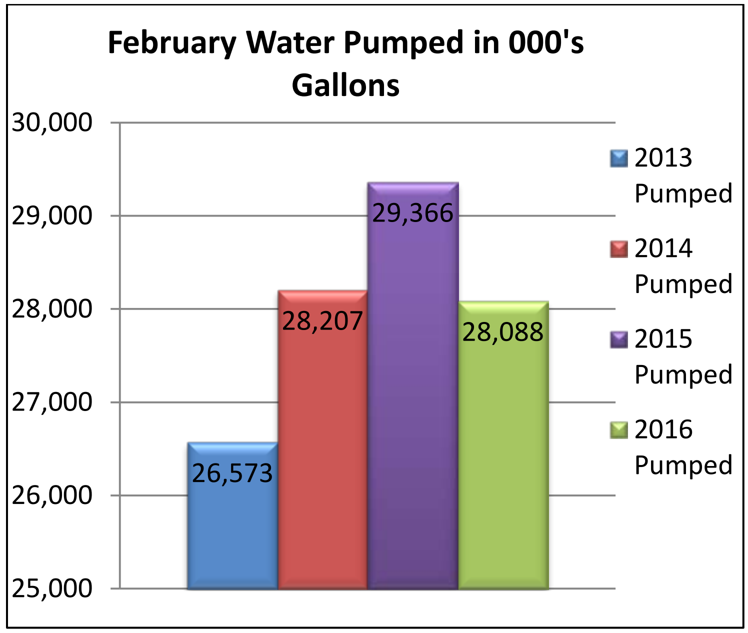
RIVER FALLS MUNICIPAL UTILITIES

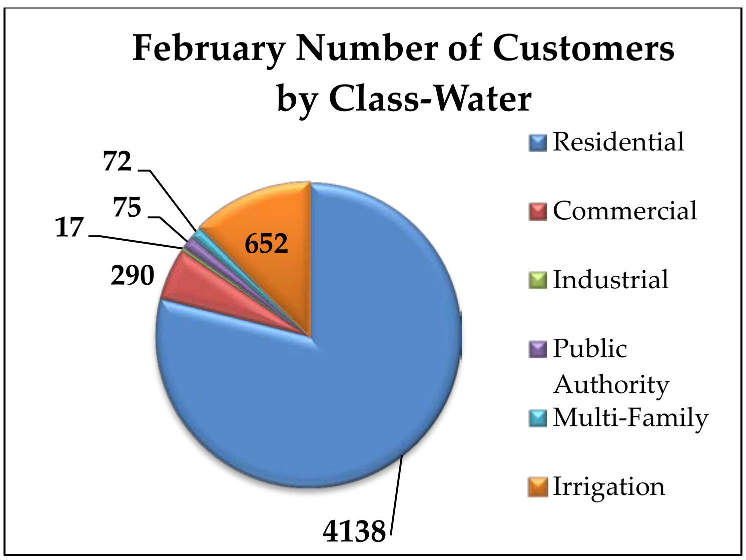
Providing a safe and reliable supply of high quality water to the River Falls community we serve.

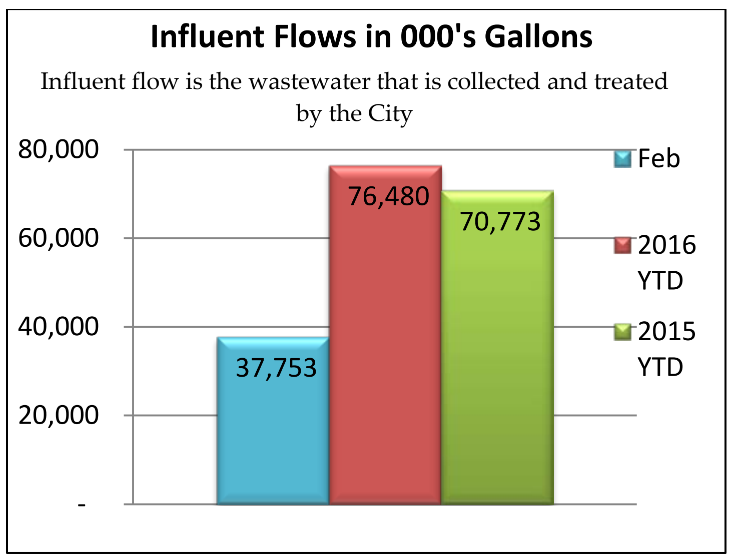
River Falls Municipal Utility
Water Dashboard

For February 2016









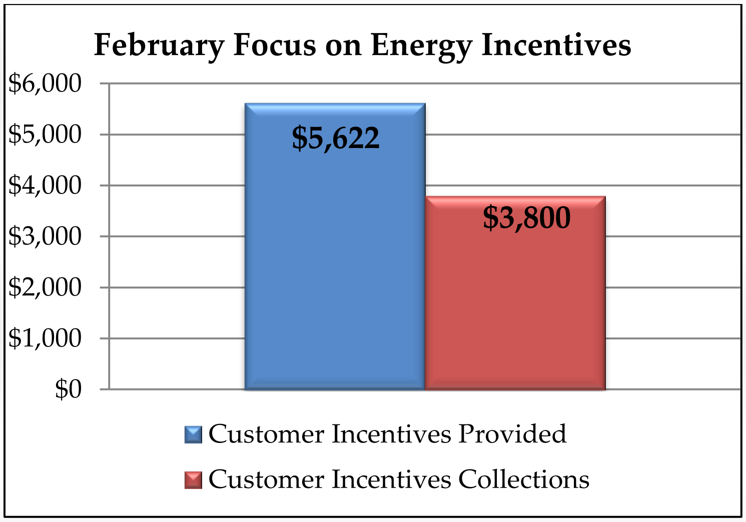
Used as a comparison between water pumped versus water treated.

For more information please contact: Kevin Westhuis
(715) 426-3442 or kwesthuis@rfcity.org

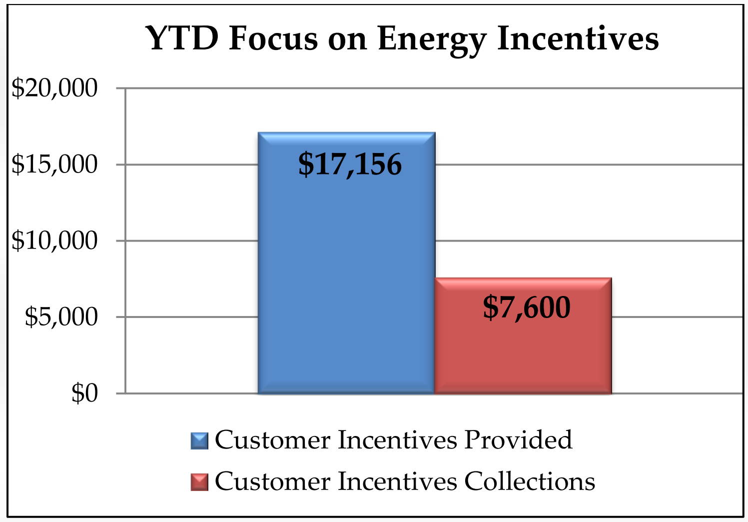
POWERful Choices! Dashboard

For February 2016

Focus on Energy Program

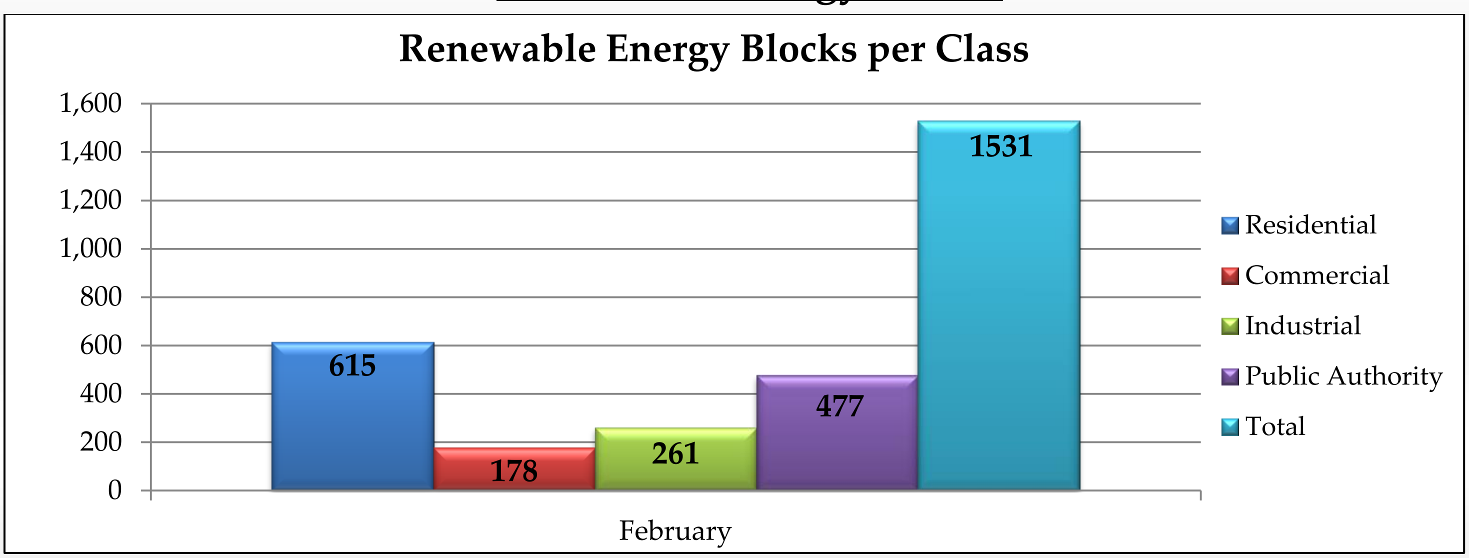


The total customer incentives provided for February compared to the customer incentives collections from Focus on Energy.



The year-to date customer incentives provided compared to the customer incentives collections from Focus on Energy.

Renewable Energy Blocks



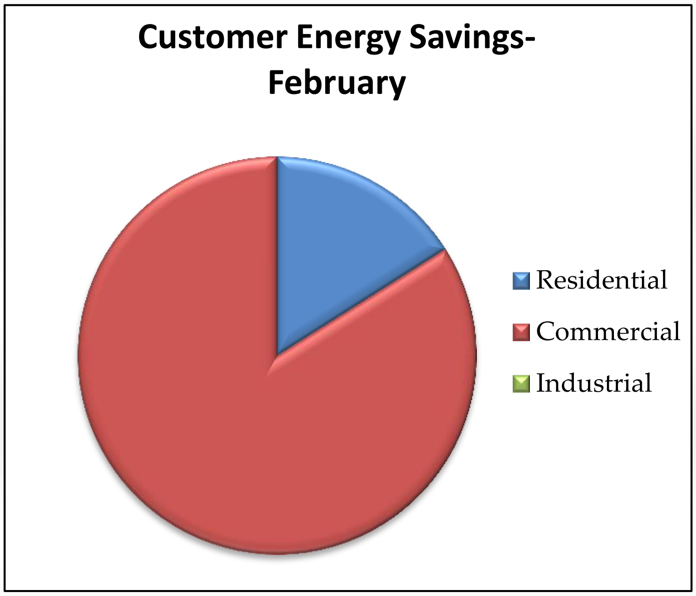
River Falls currently ranks 10th in the nation for customer participation and 2nd in Wisconsin. The 2016 goal is for River Falls to become first in the state. Renewable energy blocks are sold at $3 for 300 kWh of renewable energy. The goal is to reach 10 percent customer participation by December 2016.

POWERFUL CHOICES
a sustainable energy project for river falls

For more information please contact: Mike Noreen
(715) 426-3467or mnoreen@rfcity.org

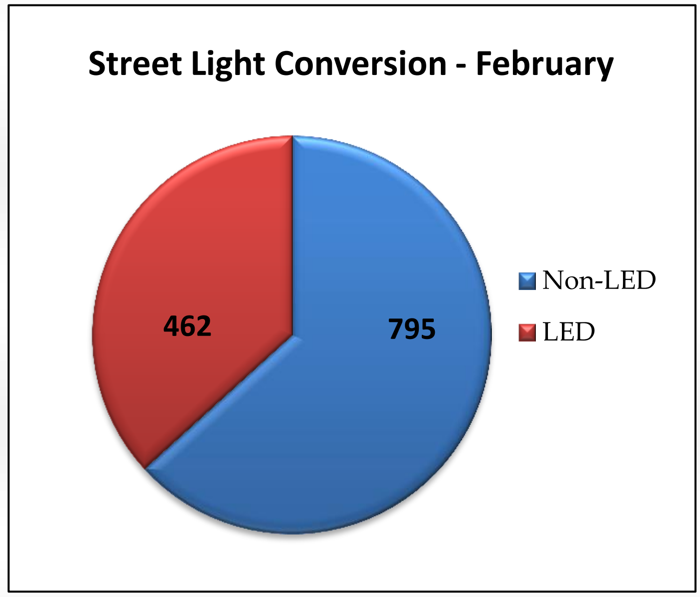
POWERful Choices! Dashboard

Energy Savings



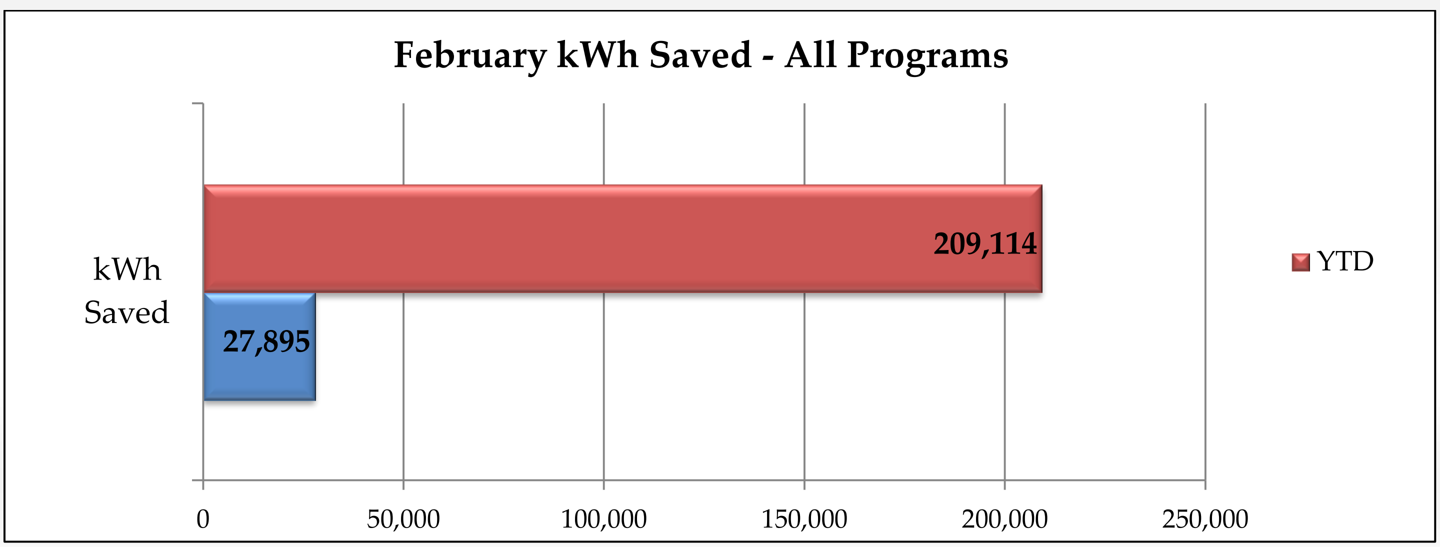
Monthly cumulative percentage of kilowatt hours saved per customer sector.

Street Light Conversion Program



This change is another example of our City leading by example in energy efficiency and environmental stewardship. The goal is to have 70 percent of the street lights converted to LED by 2018.

kWh Saved

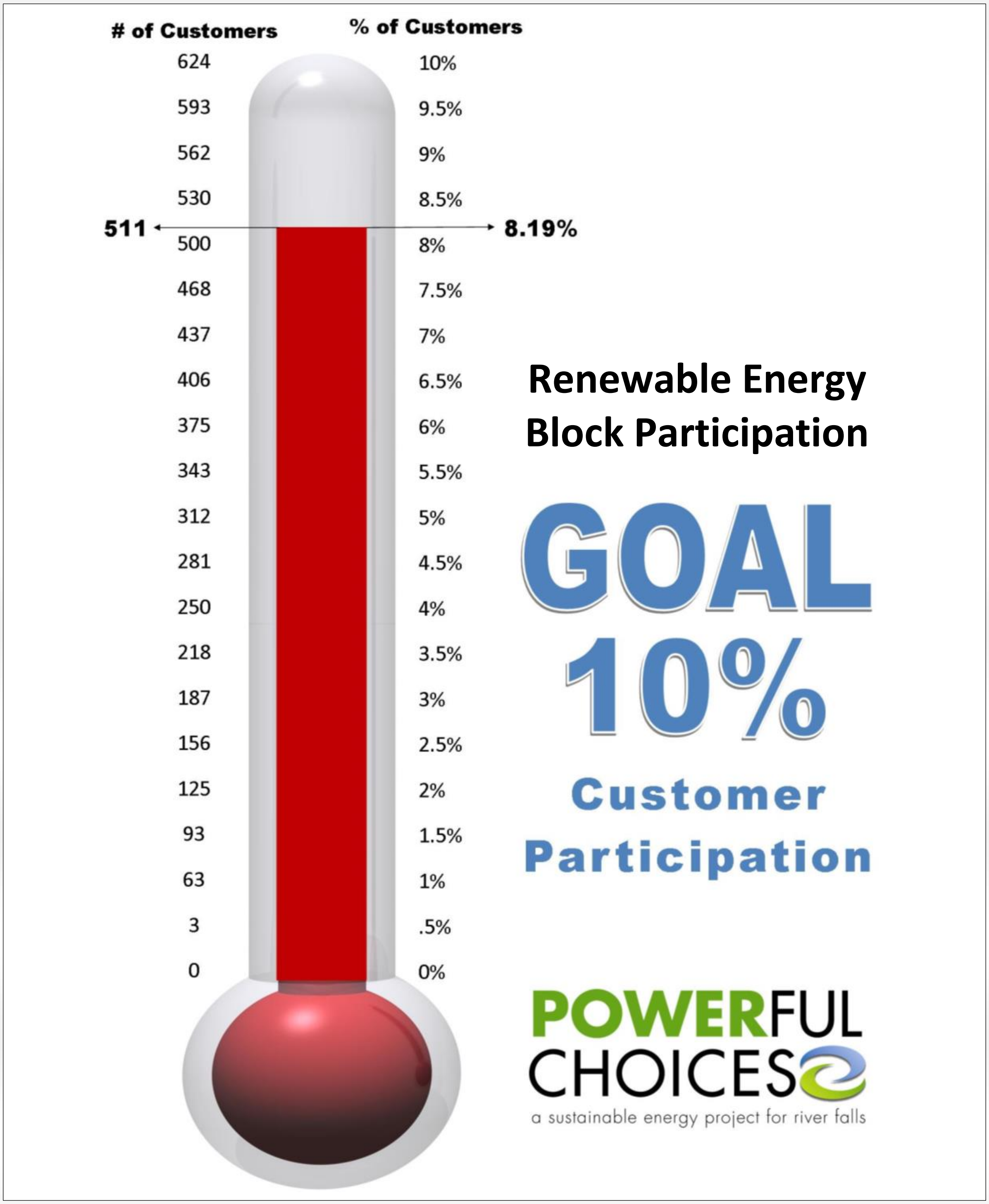


Energy savings resulting from programs such as upgrades to lighting, motors, HVAC, variable frequency drives, and refrigeration. All customer sectors are included.

POWERFUL CHOICES
a sustainable energy project for river falls

For more information please contact: Mike Noreen
(715) 426-3467or mnoreen@rfcity.org

POWERful Choices! Dashboard



River Falls currently ranks 10th in the nation for customer participation and 2nd in Wisconsin. The 2016 goal is for River Falls to become first in the state. The current level of customer participation in Renewable Energy Blocks is 8.01 percent. The goal is to reach 10 percent customer participation.

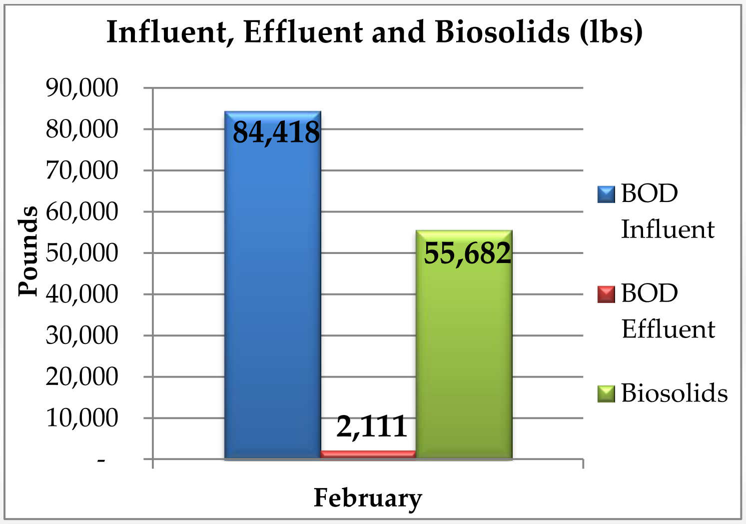
POWERFUL CHOICES
a sustainable energy project for river falls

For more information please contact: Mike Noreen
(715) 426-3467or mnoreen@rfcity.org

River Falls Municipal Utilities
Waste Water Treatment Plant

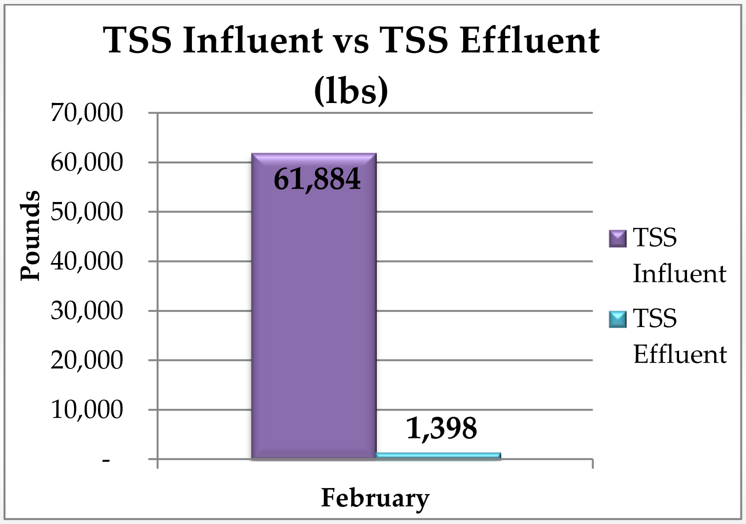
For February 2016

Influent, Effluent and Biosolids (lbs.)



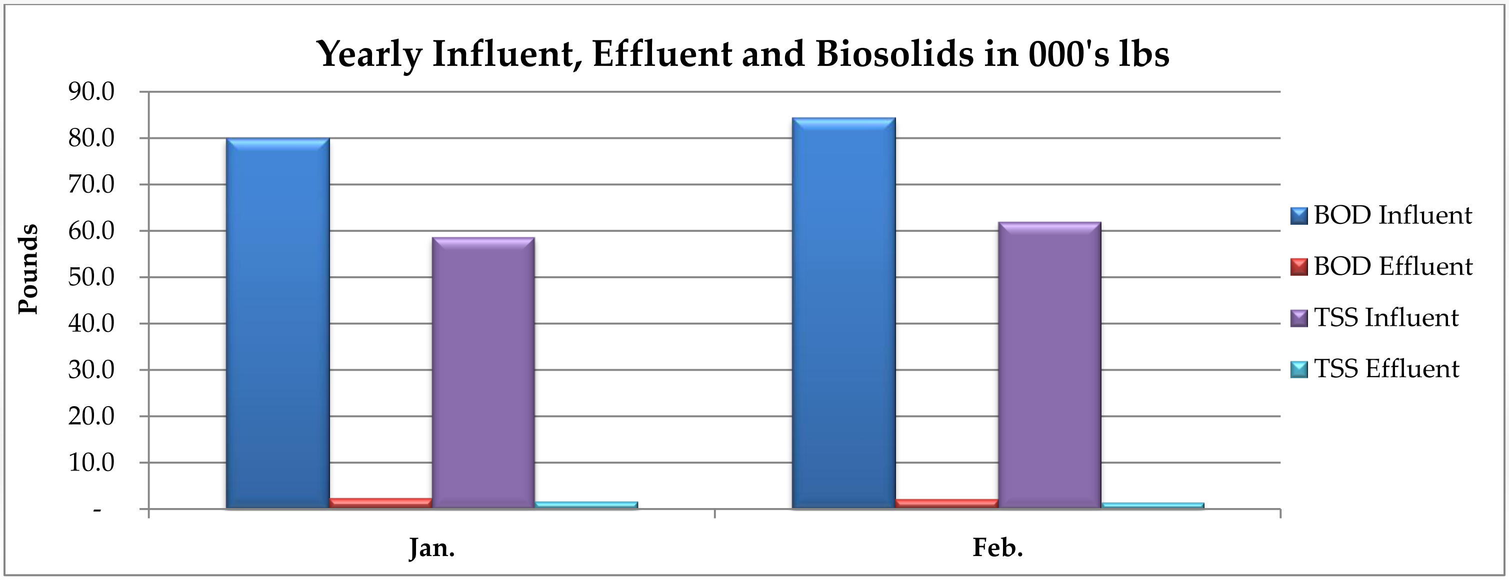
The Biochemical Oxygen Demand (BOD) Influent and BOD Effluent pounds represent pounds of oxygen needed for treatment.

TSS Influent vs TSS Effluent (lbs)



The TSS Influent and TSS Effluent represent the pounds of Total Suspended Solids entering the Waste Water Treatment Plant versus going out into the Kinnickinnic River.

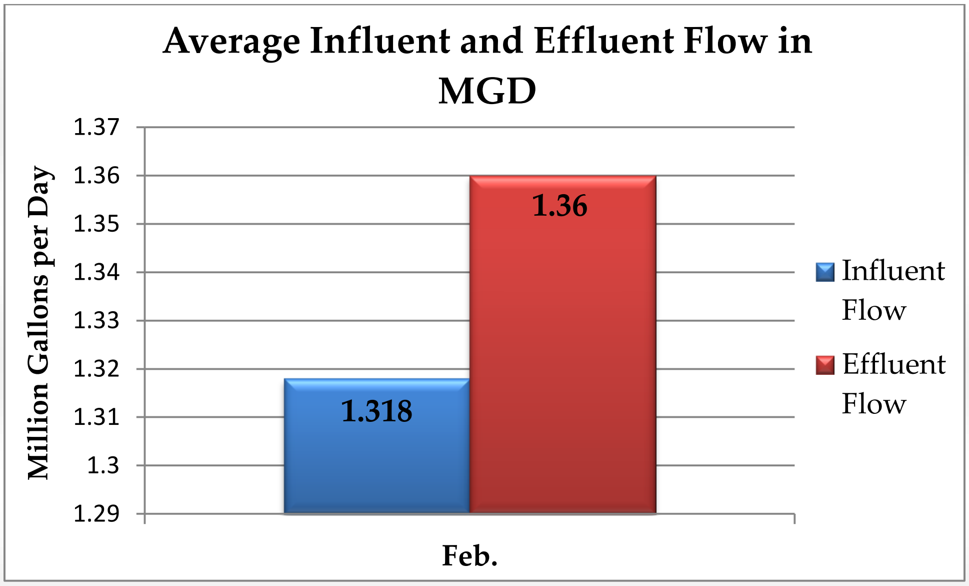
Yearly BOD and TSS Influent and Effluent (in 000’s lbs.)



This graph represents the average monthly pounds of both BOD and TSS coming into the plant and being discharged at the plant`s outfall into the Kinnickinnic River for the year 2016.

River Falls Municipal Utilities
Waste Water Treatment Plant

Average Influent and Effluent Flow in MGD



This graph represents the average daily flow into the treatment plant as well as the average daily flow discharged into the Kinnickinnic River. The design flow for the Treatment plant is 1.8 million gallons per day (MGD).

WWTP Facts

Vocabulary:

BOD: Biochemical Oxygen Demand represents pounds of oxygen needed for treatment.

EFFLUENT: Water and waste flowing out of the Waste Water Treatment Plant.

INFILTRATION: to pass into or through (a substance) by filtering or permeating. Infiltration numbers are self-induced and not leak related.

INFLUENT: Water and waste flowing into the Waste Water Treatment Plant.

TSS: Total Suspended Solids are solid materials, including organic and inorganic, that are suspended in the water and have to be removed.

Did You Know….

- Excess bacteria removed from the Treatment Plant is called Bio-Solids which can be land spread or treated more to become a fertilizer or soil conditioner.

For more information please contact: Bill Swenson
(715) 426-3531 or wswenson@rfcity.org

eReliabilityTracker™

2015 Annual Report

River Falls Municipal Utilities

The eReliability Tracker Annual Report was created by the American Public Power Association to assist utilities in their efforts to understand and analyze their electric system. This report focuses on distribution system reliability across the country and is customized to each utility’s system. The data used to generate this report reflect activity in the eReliability Tracker from January 1, 2015 to December 31, 2015. Note that if you currently do not have a full year of data in the system, this analysis may not properly reflect your utility's statistics since it only includes data recorded for your utility as of February 10, 2016; therefore, any changes made after that date are not represented in this report.

I. General Overview

Reliability reflects historic and ongoing engineering investment decisions within a utility. Proper use of reliability metrics ensures that the utility is not only performing its intended function, but also is providing service in a consistent and effective manner. Even though the primary use of reliability statistics is for self-evaluation, utilities can use these statistics to compare with data from similar utilities. However, differences such as electrical network configuration, ambient environment, weather conditions, and number of customers served typically limit most utility-to-utility comparisons. Due to the diverse range of utilities that use the eReliability Tracker, this report endeavors to group utilities by size and region to improve comparative analyses while reducing differences.

Since this report contains overall data for all utilities that use the eReliability Tracker, it is important to consider the effect that a particularly large or small utility can have on the rest of the data. To ease the issues associated with comparability, reliability statistics are calculated for each utility with their respective customer weight taken into account prior to being aggregated with other utilities. All utilities are equally weighted and all statistics are developed on a per customer basis.

The aggregate statistics displayed in this report are calculated from utilities that experienced more than two outages in 2015. Also, utilities that experienced no outages this year, or did not upload any data, will have None/Null values in their report for their utility-specific data and were not included in the aggregate analysis.

The aggregate statistics provided in the following sections of the report are based on data from 175 utilities, all of which recorded more than two outages during the time period of analysis.

To limit the comparison of utilities of truly different sizes, this report separates utilities into groups according to their number of customers served. In Table 1, the customer size distribution of utilities that use the eReliability Tracker is split into fifths to create five distinct customer size classes.

Since the utilities considered in this report represent a wide variety of locations across the United States, each utility is grouped with all others located in their corresponding APPA region. Figure 1 shows the number of utilities using the eReliability Tracker in each APPA region and Figure 2 displays the current United States map of APPA regional divisions.

Your utility belongs to customer size class 2 and region 2.

Table 1
Customer size range per customer size class

Class 1:	0 -3,740
Class 2:	3,740 - 6,248
Class 3:	6,248 - 9,654
Class 4:	9,654 - 16,724
Class 5:	16,724- 430,528

Figure 1
Number of eRT utilities per APPA region

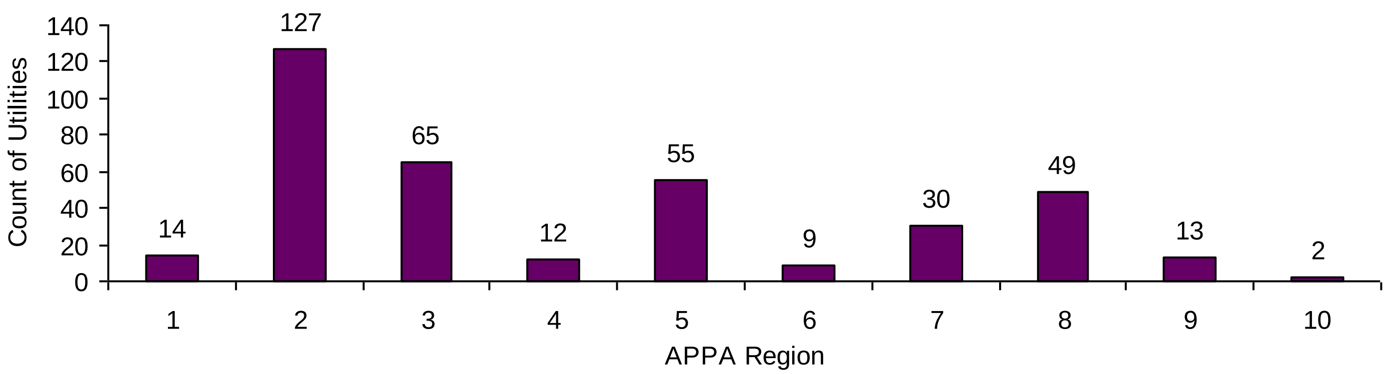
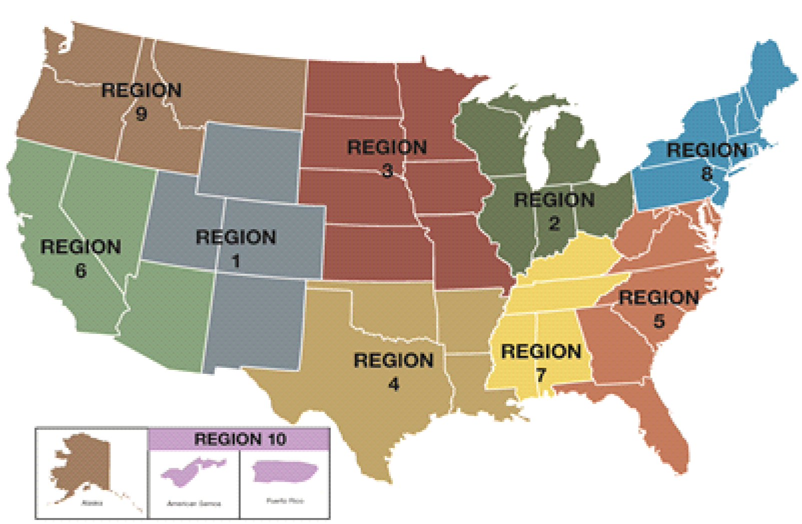


Figure 2
Map of APPA Regions as of January 1, 2015



II. IEEE Statistics

When using reliability metrics, a good place to start is with the industry standard metrics found in the IEEE 1366 guide. For each individual utility, the eReliability Tracker performs IEEE 1366 calculations for System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Customer Average Interruption Duration Index (CAIDI), Momentary Average Interruption Frequency Index (MAIFI) and Average Service Availability Index (ASAI).

When collecting the necessary data for reliability indices, utilities often take differing approaches. Some utilities prefer to include information as detailed as circuit type or phases impacted, while others include only the bare minimum required. In all cases, the more details a utility provides, the more practical their analysis will be. As a basis for calculating these statistics in the eReliability Tracker, the following are required to create an outage in the system:

-Total number of customers served on the day of the outage
-Time and date when the outage began
-Primary cause of outage
-Address where the outage was located

It is important to note that the time when the outage ended is not required in case the outage is ongoing; therefore, outages without end dates at the time of the report analysis are not included in the indices that measure duration, such as SAIDI and CAIDI. However, they are included in the calculations measuring interruption frequencies, such as SAIFI or MAIFI, as well as in the analysis of outage causes.

Due to the differences in how some utilities analyze major events (MEs) relative to their base statistics, it is important to note how they are calculated and used in this report. An example of a major event could be severe weather, such as a tornado or thunderstorm, which can lead to unusually long outages in comparison to your distribution system's typical outage. In the eReliability Tracker and in this report, the APPA major event threshold is used, which is a calculation based directly on outage events, rather than event days. The major event threshold allows a utility to remove outages that exceed the IEEE 2.5 beta threshold for events. The threshold takes into account the utility's past outage history up to 10 years in order to make this calculation. In the eReliability Tracker, if a utility does not have at least 36 outage events prior to the year being analyzed, no threshold is calculated; therefore, the field below showing your utility's threshold will be blank and the calculations without MEs in the SAIDI section of this report will be the same as the calculations with MEs for your utility. More outage history will provide a better threshold for your utility.

Your utility's major event threshold is 50.8981 (minutes).[1]

If you wish to remove major events, the threshold calculated above is important to note because it impacts your SAIDI analysis. For the next year, based on your utility's outage history, any event with a SAIDI greater than 50.8981 minutes is considered as a major event and can be removed in your analysis.

The tables in this section can be used by utilities to better understand the performance of their electric system relative to other utilities nationally and to those within their region or size class. In the SAIDI section, indices are calculated for all outages with and without major events; furthermore, the data are broken down to show calculations for scheduled and unscheduled outages. For each of the reliability

[1] If there is no major event threshold calculated for your utility, these fields are left blank and the calculations in this report including Major Events and excluding them will be the same. Your utility must have at least 36 outage events recorded in the eReliability Tracker in order to calculate a Major Event Threshold.

System Average Interruption Duration Index (SAIDI)

SAIDI is defined as the average interruption duration (in minutes) for customers served by the utility system during a specific time period.

Since SAIDI is a sustained interruption index, only outages lasting longer than five minutes are included in the calculations. SAIDI is calculated by dividing the sum of all customer interruption durations within the specified time frame by the average number of customers served during that period. For example, a utility with 100 customer minutes of outages and 100 customers would have a SAIDI of 1.

Note that in the tables below, scheduled and unscheduled calculations include major events.

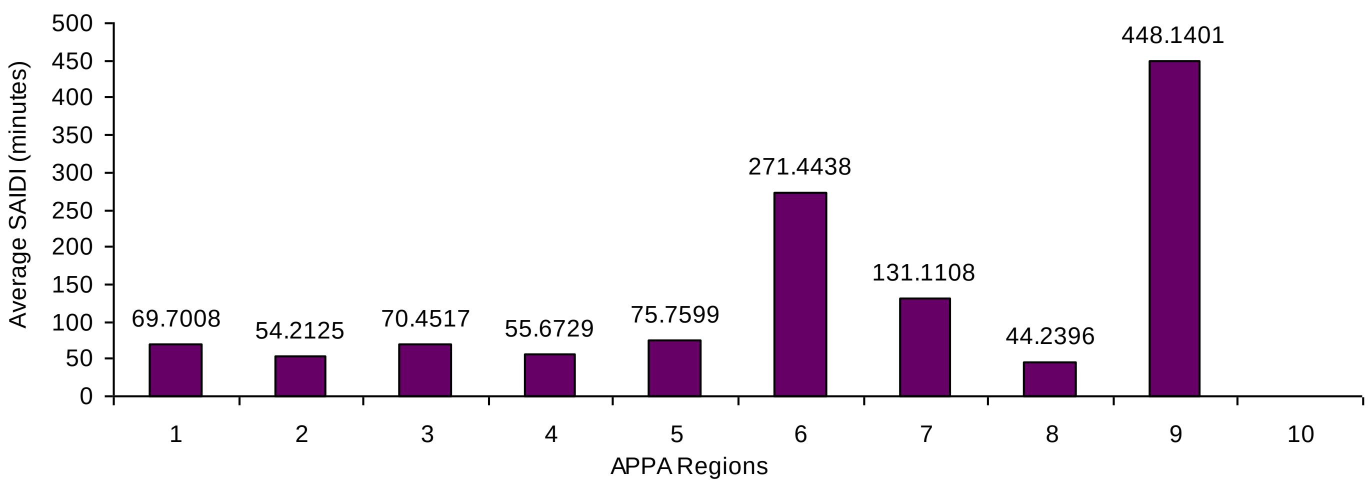
Table 2
Average SAIDI for all utilities that use the eReliability Tracker (with and without MEs), belong to your region, and are grouped in your customer size class

	All	No MEs	Unscheduled	Scheduled
Your utility's SAIDI:	19.5636	19.5636	19.5636	0
Average eReliability Tracker Utility SAIDI	97.0148	42.3208	95.2375	1.7729
Average SAIDI for Utilities Within Your Region	54.2125	37.4714	52.9303	1.2779
Average SAIDI for Utilities Within Your Customer Size Class	137.8247	38.6904	135.8639	1.9399

Table 3
Summary statistics of the SAIDI data compiled from the eReliability Tracker

	All	No MEs	Unscheduled	Scheduled
Minimum Value	0.1755	0.1755	0.1755	0
First Quartile (25th percentile)	17.1333	9.4969	15.9108	0
Median Quartile (50th percentile)	39.7628	19.5701	39.3258	0.0894
Third Quartile (75th percentile)	99.9518	50.8999	97.9968	1.3163
Maximum Value	1477.7538	430.4867	1467.3683	27.3566

Figure 3
Average SAIDI for all utilities that use the eReliability Tracker per region



System Average Interruption Frequency Index (SAIFI)

SAIFI is defined as the average number of instances a customer on the utility system will experience an interruption during a specific time period.

Since SAIFI is a sustained interruption index, only outages lasting longer than five minutes are included in the calculations. SAIFI is calculated by dividing the total number of customer interruptions by the average number of customers served during that time period. For example, a utility with 150 customer interruptions and 200 customers would have a SAIFI of .75 interruptions per customer.

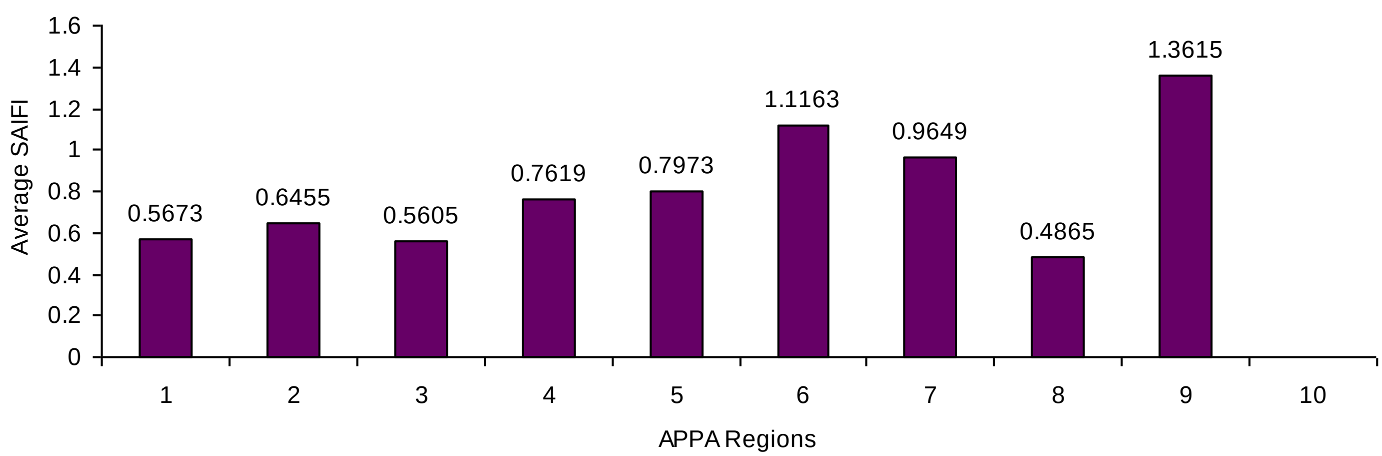
Table 4
Average SAIFI for all utilities that use the eReliability Tracker, belong to your region, and are grouped in your customer size class

Your utility's SAIFI:	0.152
Average eReliability Tracker Utility SAIFI	0.7355
Average SAIFI for Utilities Within Your Region	0.6455
Average SAIFI for Utilities Within Your Customer Size Class	0.854

Table 5
Summary statistics of the SAIFI data compiled from the eReliability Tracker

Minimum Value	0.002
First Quartile (25th percentile)	0.214
Median Quartile (50th percentile)	0.4845
Third Quartile (75th percentile)	1.0446
Maximum Value	3.4219

Figure 4
Average SAIFI for all utilities that use the eReliability Tracker per region



Customer Average Interruption Duration Index (CAIDI)

CAIDI is defined as the average duration (in minutes) of an interruption experienced by customers during a specific time frame.

Since CAIDI is a sustained interruption index, only outages lasting longer than five minutes are included in the calculations. It is calculated by dividing the sum of all customer interruption durations during that time period by the number of customers that experienced one or more interruptions during that time period. This metric reflects the average customer experience (minutes of duration) during an outage.

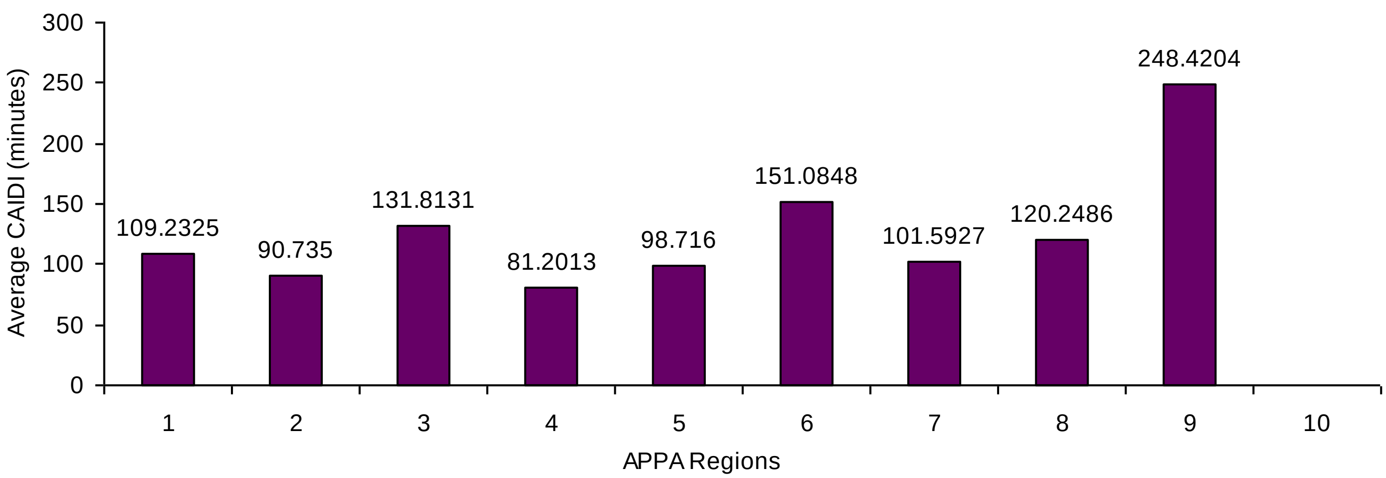
Table 6
Average CAIDI for all utilities that use the eReliability Tracker, belong to your region, and are grouped in your customer size class

Your utility's CAIDI:	128.7153
Average eReliability Tracker Utility CAIDI	113.6645
Average CAIDI for Utilities Within Your Region	90.735
Average CAIDI for Utilities Within Your Customer Size Class	115.154

Table 7
Summary statistics of the CAIDI data compiled from the eReliability Tracker

Minimum Value	12.5379
First Quartile (25th percentile)	66.125
Median Quartile (50th percentile)	87.8417
Third Quartile (75th percentile)	129.0366
Maximum Value	868.8994

Figure 5
Average CAIDI for all utilities that use the eReliability Tracker per region



Momentary Average Interruption Frequency Index (MAIFI)

MAIFI is defined as the average number of times a customer on the utility system will experience a momentary interruption.

In this report, an outage with a duration of less than five minutes is classfied as momentary. The index is calculated by dividing the total number of momentary customer interruptions by the total number of customers served by the utility. Momentary outages can be more difficult to track and many smaller utilities may not have the technology to do so; therefore, some utilities may have a MAIFI of zero.

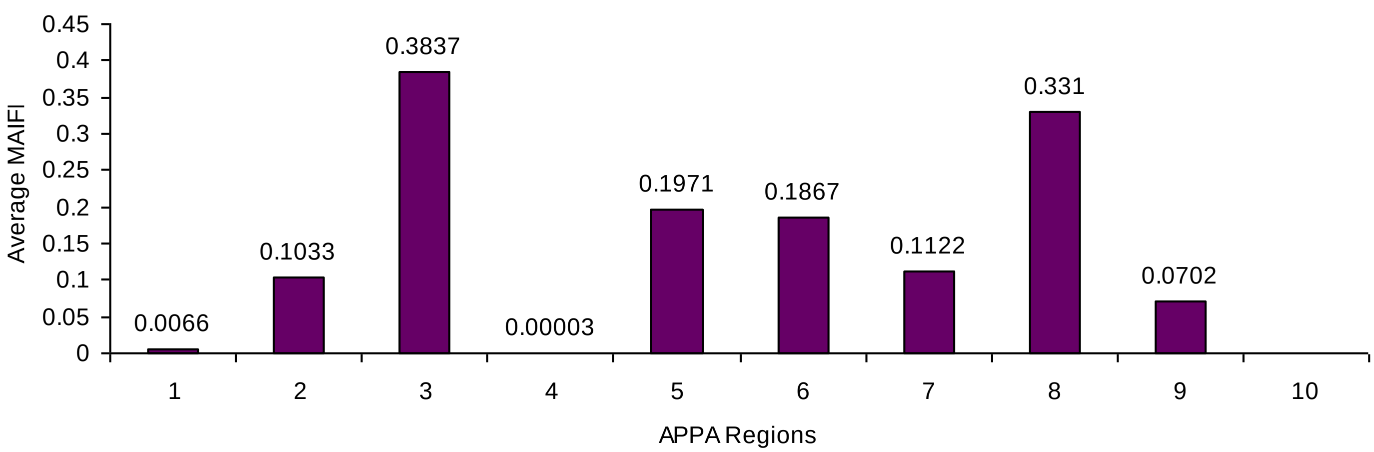
Table 8
Average MAIFI for all utilities that use the eReliability Tracker, belong to your region, and are grouped in your customer size class

Your utility's MAIFI:	0
Average eReliability Tracker Utility MAIFI	0.1813
Average MAIFI for Utilities Within Your Region	0.1033
Average MAIFI for Utilities Within Your Customer Size Class	0.0339

Table 9
Summary statistics of the MAIFI data compiled from the eReliability Tracker

Minimum Value	0
First Quartile (25th percentile)	0
Median Quartile (50th percentile)	0
Third Quartile (75th percentile)	0.0031
Maximum Value	3.7774

Figure 6
Average MAIFI for all utilities that use the eReliability Tracker per region



Average Service Availability Index (ASAI)

ASAI is defined as a measure of the average availability of the sub-transmission and distribution systems that serve customers.

This load-based index represents the percentage availability of electric service to customers within the time period analyzed. It is caclulated by dividing the total hours service is available to customers by the total hours that service is demanded by the customers.

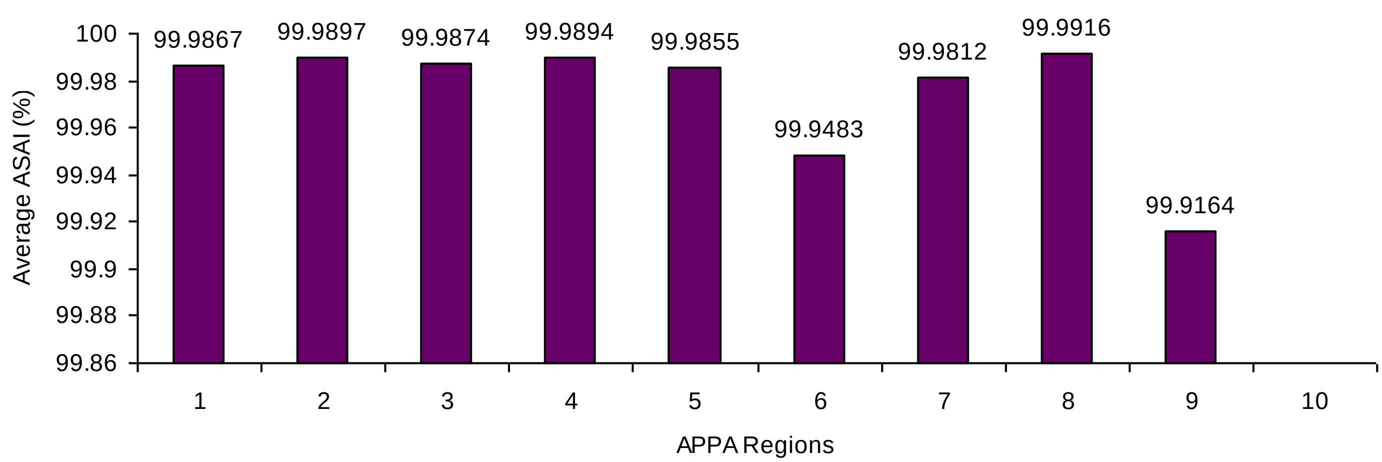
Table 10
Average ASAI for all utilities that use the eReliability Tracker, belong to your region, and are grouped in your customer size class

Your utility's ASAI (%):	99.9963
Average eReliability Tracker Utility ASAI	99.9824
Average ASAI for Utilities Within Your Region	99.9897
Average ASAI for Utilities Within Your Customer Size Class	99.9737

Table 11
Summary statistics of the ASAI data compiled from the eReliability Tracker

Minimum Value	99.7188
First Quartile (25th percentile)	99.9809
Median Quartile (50th percentile)	99.9924
Third Quartile (75th percentile)	99.997
Maximum Value	99.9999

Figure 7
Average ASAI for all utilities that use the eReliability Tracker per region



2014 Energy Information Administration (EIA) Form 861 Data

Form EIA-861 collects information on the status of electric power industry participants involved in the generation, transmission, distribution, and sale of electric energy in the United States, its territories, and Puerto Rico.

EIA surveys electric power utilities annually through EIA Form 861 to collect electric industry data and subsequently make that data available to the public. In 2014, EIA began requesting reliability statistics in their survey from utility participants; therefore, APPA included EIA reliability statistics in this report for informational purposes. Please note that the following data includes investor-owned, rural cooperative, and public power utilities that were large enough to be required to fill out the full EIA 861, not the EIA 861-S form (for smaller entities). In addition, since the collection and release of EIA form data lags by more than a year, the data provided is based on 2014 data only. Therefore, it is suggested that the aggregate statistics contained herein be used only as an informational tool for further comparison of reliability statistics.

In the table, if an entity calculates SAIDI, SAIFI, and determines major event days in accordance with the IEEE 1366-2003 or IEEE 1366-2012 standard, they are included under the "IEEE Method" columns. If the entity calculates these values via another method, they are included under the "Other Method" columns.

There were approximately 1230 utilities that submitted reliability data to the EIA. Additionally, it looks as though a number of utilities submitted incorrect data, which shows itself most in the average SAIFI numbers. For more general information on reliability metrics you can see APPA's website at http://publicpower.org/reliability. Although EIA collected other reliability related data, the tables below only include SAIDI and SAIFI data. The full set of data can be downloaded at this link: http://www.eia.gov/electricity/data/eia861/

Table 12
Summary statistics of the SAIDI data compiled from 2014 data collected by EIA

	IEEE Method		Other Method	
	All	No MEDs	All	No MEDs
Average	228.1558	114.4970	200.9327	114.8118
Minimum Value	0.0000	0.0000	0.0000	0.0000
First Quartile (25th percentile)	53.1505	44.9200	20.0000	8.0000
Median Quartile (50th percentile)	123.0000	92.0400	69.9800	54.0000
Third Quartile (75th percentile)	244.3750	141.0875	169.0000	121.5640
Maximum Value	7,266.4000	1574.6000	12,299.0000	5,248.0000

Table 13
Summary statistics of the SAIFI data compiled from 2014 data collected by EIA

	IEEE Method		Other Method	
	All	No MEDs	All	No MEDs
Average	1.7972	1.5104	1.9503	1.5963
Minimum Value	0.0000	0.0000	0.0000	0.0000
First Quartile (25th percentile)	0.8030	0.6600	0.4525	0.2500
Median Quartile (50th percentile)	1.2900	1.0540	1.0000	0.8200
Third Quartile (75th percentile)	1.8675	1.5000	1.8000	1.4850
Maximum Value	118.2000	118.2000	72.2450	50.5000

III. Outage Causes

Equipment failure, extreme weather events, wildlife and vegetation are some of the most common causes of electric system outages. However, certain factors, such as regional weather and animal/vegetation patterns, can make a different set of causes more prevalent to a specific group of utilities. The following sections of this report include graphs depicting common causes of outages for your individual utility, all utilities in your region, and all utilities using the eReliability Tracker. The charts containing aggregate information are customer-weighted to account for differences in utility size for a better analytical comparison. For example,a particularly large utility may have a large number of outages compared to a small utility; in order to not have the collective information be more representative of the large utility, the number of occurrences is divided by customer size to account for the differences. In the figures below, the data represent the number of occurrences for each group of 1000 customers. For instance, a customer-weighted occurrence rate of "1" means 1 outage of that outage cause per 1000 customers on average in 2015.

Note that the sustained outage cause analysis is more comprehensive than the momentary outage cause analysis due to a bigger and more robust sample size for sustained outages. Regardless, tracking both sustained and momentary outages helps utilities understand and reduce outages. To successfully use the outage information tracked by your utility, it is imperative to classify and record outages in detail. The more information provided per outage, the more conclusive and practical your analyses will be.

Sustained Outage Causes

In general, sustained outages are the most commonly tracked outage type. In many analyses of sustained outages, utilities tend to exclude scheduled outages, partial power, customer-related problems, and qualifying major events from their reliability indices calculations. While this is a valid method for reporting, these outages should be included for internal review to make utility-level decisions. In this section, we evaluate common causes of sustained outages for your utility, corresponding region, and for all utilities that use the eReliability Tracker. It is important to note that in this report, sustained outages are classified as outages that last longer than five minutes, as defined by IEEE 1366.

Figure 8
Top five customer-weighted occurrence rates for common causes of sustained outages for all utilities that use the eReliability Tracker System[2]

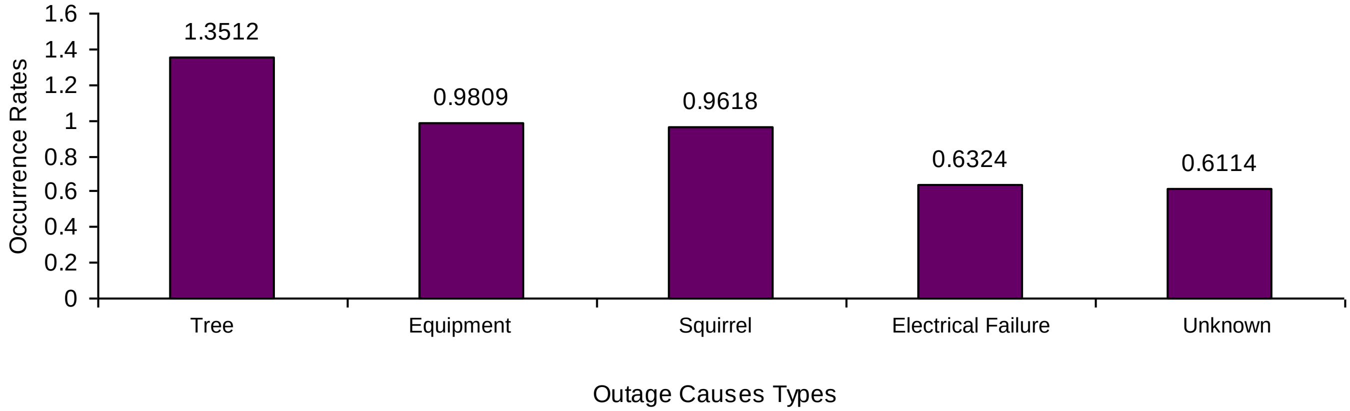


Figure 9
Top five customer-weighted causes of sustained outages for your utility[2]

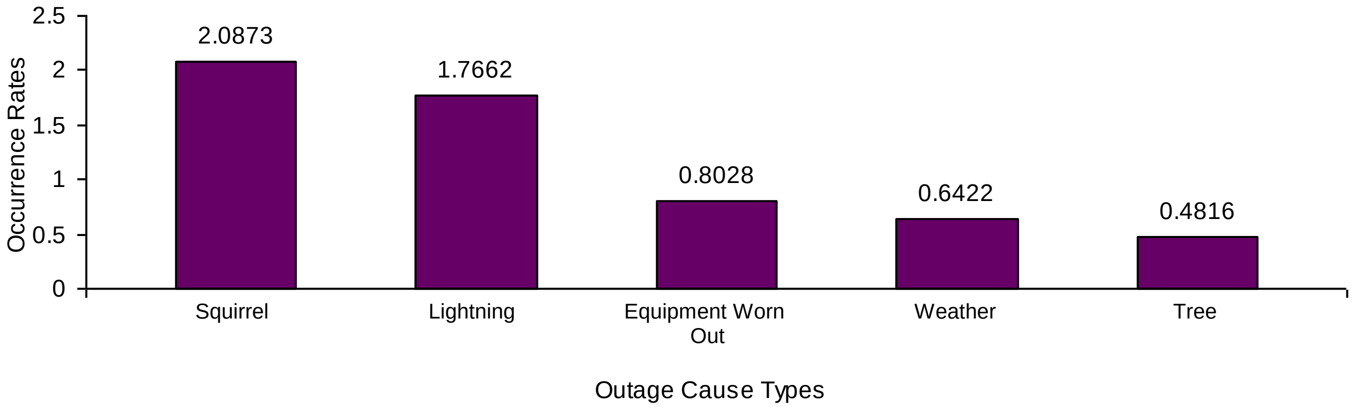
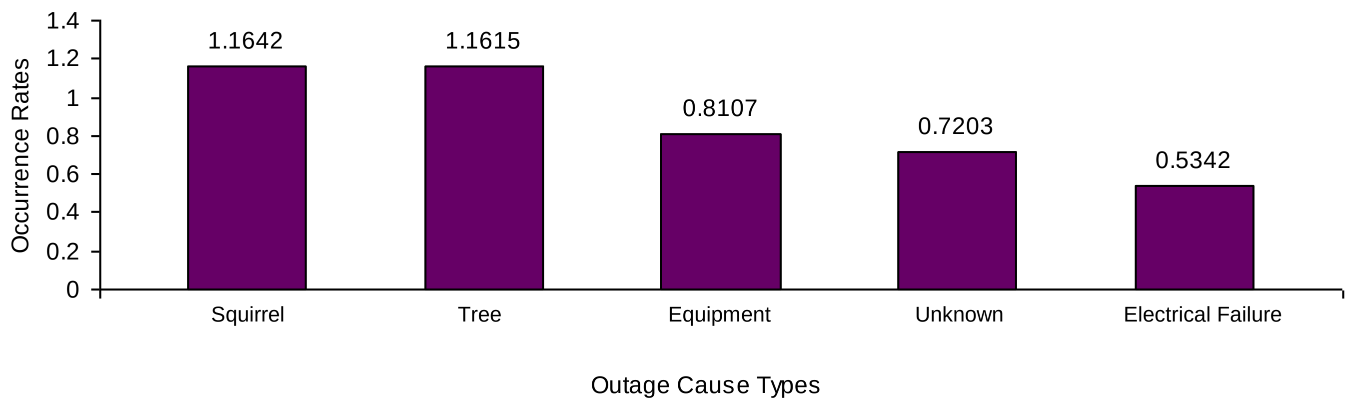


Figure 10
Top five customer-weighted occurrence rates for sustained outage causes in your region[2]



[2] For each utility, the number of occurrences for each cause is divided by that utility's customer size (in 1000s) to create an occurence rate that can be compared across different utility sizes.

Momentary Outage Causes

The ability to track momentary outages can be difficult or unavailable on some systems, but due to the hazard they pose for electronic equipment, it is important to track and analyze their causes. In this section, we evaluate common causes of momentary outages for your utility, region and customer size class as well as common causes for all utilities that use the eReliability Tracker. Please note that only outages lasting less than five minutes are classified as momentary, as defined by IEEE 1366.

Figure 11
Top five customer-weighted occurrence rates for common causes of momentary outages for all utilities that use the eReliability Tracker System [2]

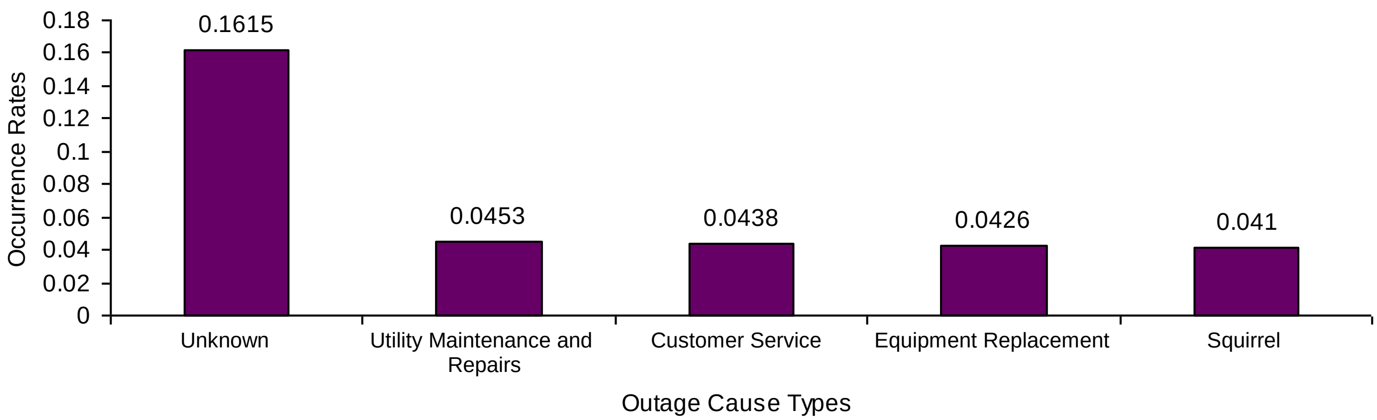
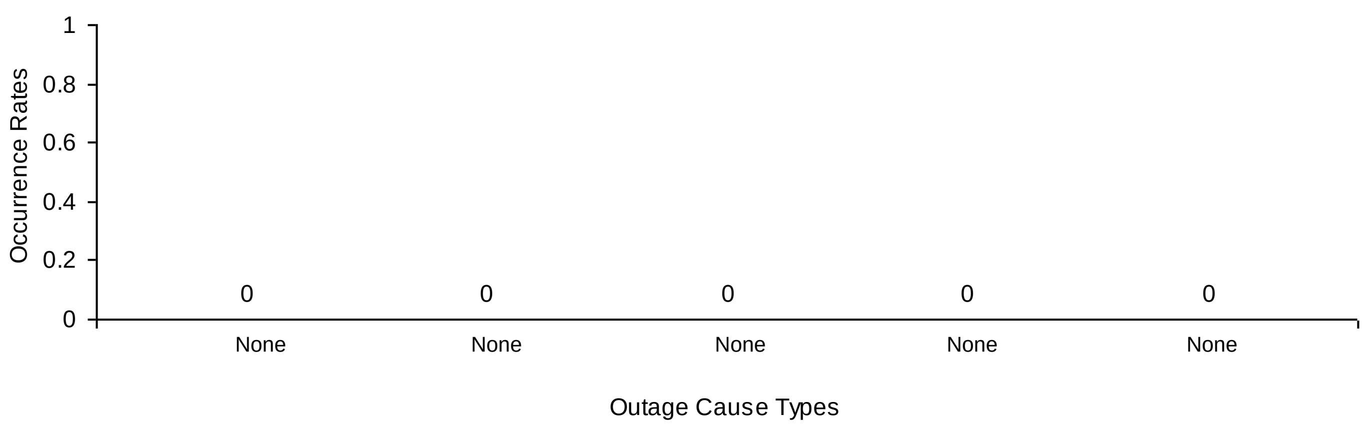
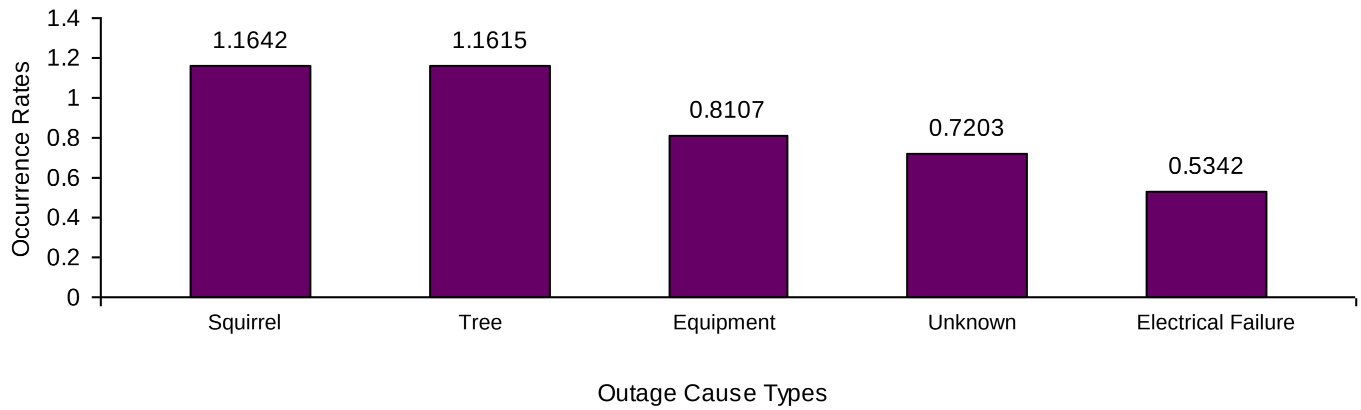


Figure 12
Top five customer-weighted causes of momentary outages for your utility [2, 3]



[3] If your utility has less than eight momentary outages recorded in the eReliability Tracker, this graph will be blank.

Figure 13
Top five customer-weighted occurrence rates for momentary outage causes in your region[2]



Thank you for using the eReliability Tracker and we hope this report is useful to your utility in analyzing your system. If you have any questions regarding the material provided in this report, please contact:

Tanzina Islam
Energy and Environmental Manager
TIslam@PublicPower.org
202.467.2961

Alex Hofmann
Director, Energy and Environmental Services
AHofmann@PublicPower.org
202.467.2956

Michael J. Hyland
Senior Vice President, Engineering Services
MHyland@PublicPower.org
202.467.2986

The eReliability Tracker was funded by a grant from the Demonstration of Energy & Efficiency Developments (DEED) Program.

River Falls Municipal Utilities
Monthly Report
February 2016

ELECTRIC

- Maintenance repairs performed. This is maintenance work found through our required system inspections.
- Substation monthly inspections completed.
- Underground services, the winter lateral fee for these new services is still in effect.
- Replacing street lights with LED fixtures. Repaired the ones we could replace with bulbs and photo eyes.
- Meter readings continue monthly with meter reads.
- Yearly Transmission inspections have been completed.
- Yearly Underground inspections have started. This is a 5 year rotation between our feeders.
- Yearly Overhead inspections have been completed.
- Both hydro's were taken down to rake/clean the intake and were put back on line.
- Moved the fiber by the power plant for the new substation project.

RIVER FALLS WASTE WATER TREATMENT FACILITY

- Two mixers went down on February 1st in the sludge storage ditch and will need rebuilding.
- Hosted contractor meeting for the WWTF upgrade project to give opportunity for potential bidders to ask questions and get a firsthand look at the scope of the project.
- Stared sampling on February 8th for wet test of plant effluent for 2016 permit compliance (this is a three day sampling event).
- Bid opening was held for new solids handling building project on February 9th.
- Started disassembly of main lift pump # 1 at head of plant. This is a scheduled shutdown, as this pump is to be replaced with new unit.
- Received results from wet test on February 17th, which showed excellent quality effluent. These results were submitted to the DNR.
- Feb 22 -26 - tear down of pump #1 complete and assembly of new pump started.
- Hauled 3,321,237 gallons to the Ellsworth bio-solids facility in 2015. That is down about 60,000 gallons from 2014.

WATER/SEWER

- RFMU hosted a small systems seminar for the WI Section of the American Water Works Association (included a water system tour).
- Luke & Jake attended training in Eau Claire on Hydrants and Valves.
- Consolidated inventory for better efficiency in cold storage location.
- Setting up mapping grids for valve exercising program.
- Looking into summer interns for summer seasonal position.
- Presented water system update to City Council.
- Setup new process for better protection of water infrastructure on new developments.
- Initiated water system tour with new Police Chief Gordon Young to better understand our safety needs.

ENGINEERING TECH WORK

- Inspect 4 (new home) water/sanitary laterals.
- Update mapping with 2015 Sanitary lining data and two lines were re-televised.
- Map January street lights LED replacements and repairs.
- 2016 Sanitary lining out for bid on Quest and have bid opening.
- Gave ArcReader Training to a group at the Police Dept. and Public Works.
- Work with team on the upcoming "Contractors Meeting" for March.
- Continue work on 2016 Man Hole rehab project.
- Field - confirm sanitary issues with Greg for 2016 lining project and field mark san/storm lines at the Power plant for boring work.

CONSERVATION AND EFFICIENCY

- Community Solar
  - Selling shares in the community solar site is the top priority
  - Currently 121 panels under contract
- Loan program
  - 3 loans for community solar have been processed
- Green Block Program
  - The City of River Falls customer participation rate continues to climb to record levels, which is now greater than 8.19%.
- Large Power Customers
  - Continue to visit and assist multiple customers regarding energy efficiency, advanced metering infrastructure, community solar and Focus on Energy programming.
- Schools
  - National Theater for Children visited all the elementary schools in River Falls and delivered a fun play on energy conservation, efficiency, and safety.
  - Met with elementary school principals, Focus on Energy reps and the K12 Elementary Education staff to formalize the Delivering Energy Efficiency Together (DEET). The RFSD will enroll in the energy efficiency program in March.
  - The schools will also be playing the energy education/behavior change game *Cool Choices* to help in the success of the DEET program. The RFSD will begin the Cool Choices program in the fall of 2016.
- Non Profits
  - Developed and implemented a LED light exchange at the United Church of Christ and St. Bridget's Church.
    - This program is available to any church in River Falls
    - This program is a result of the *Laudato Si'* encyclical
    - Each church will receive a display of 100 LEDs. Parishioners will receive a LED if they recycle an old incandescent bulb and bring in two non-perishable food items
    - Each LED is sealed with a sticker. On the sticker it gives instructions on how to receive 3 more free LEDs through a Focus on Energy program
- Low Income Program
  - The number of people requesting bill pay assistance is down from previous years, which is a positive sign
  - Currently working with Westcap to develop a weatherization program in River Falls
- Blue Bike Program
  - The program to deliver a free bike share program to River Falls in 2016 is making good progress
  - The Blue Bike program is a partnership between the City, UW-River Falls, Pierce County Health, Crank Worx bike shop, the RFSD, and motivated citizens
  - We expect the program ready for launch on April 22, 2016
  - There will be 4 distinct racks placed throughout town

    - Each rack will have a fix it station, signage and 4-5 bikes
    - The bikes were free and the racks were purchased from a grant from New Belgium Brewery
- Utility Box Beautification Project
    - In February, POWERful Choices! helped refine the program
    - 4 boxes will be painted in 2016 prior to River Falls Days
    - Applications are expected to be available by mid-March.
- Guest Speaking Engagements and Committees
    - Wisconsin Water Association – Small Systems training
    - Forward Foundation
    - POWERful Choices!
    - Blue Bike Program
    - Green Teams
    - Healthy Foundations

For January 1, 2016 – January 31, 2016

Move in applications = 3,729 – I believe this number is skewed due to updating garbage service.
New Access My Account = 70
Disconnected Services = 0
Reconnected Services = 0

As of **2-29-16** we had a total of 6676 Active utility Accounts.

Explanation

Move in applications - Customers that came into the office to sign up for service or submitted an online application. This information also would include new construction, customers new to River Falls, and customers moving within town. Anytime we need the meters read to end one account and begin a new account.

Access My Account – This is customers logging into the utilities E-Care for the first time. E-Care is an online utility dashboard where the customers can access their individual utility account to view information and make payments.

Disconnected – These are the number of services (electric or water) disconnected for non-payment and or properties in foreclosure with outstanding balances.

Reconnected – These are the number of services (electric or water) reconnected. Customers have paid, landlords have taken over, or new owner on foreclosed properties.