KAUKAUNA UTILITIES

"Community Owned, Customer Driven"

October 28, 2011

Federal Energy Regulatory Office
Ms. Peggy A. Harding
230 S. Dearborn Street, Suite 3130
Chicago, IL 60604-1695

Subject: Water Quality Monitoring Plan -- Request for Comments:
Badger- Rapid Croche Hydroelectric Project, FERC No. 2677-019

Dear Ms. Harding:

City of Kaukauna (Kaukauna Utilities) received a new Federal Energy Regulatory Commission (FERC) License on May 18, 2011. Part of the requirements of the License includes development of a Water Quality Monitoring Plan in consultation with your agency. This letter identifies our plans to comply with the FERC License and includes a draft for your review and comment.

Specifically, Article 406 requires the City to submit a plan to FERC within one-year of the award of License. The Plan includes monitoring temperature, dissolved oxygen and pH upstream and downstream of the Badger Development (Kaukauna Dam and Powerhouse) and Rapide Croche Dam and Powerhouse.

Article 407 requires the City to operate the project flows to deliver a minimum of 300 cfs via the spillway (natural channel) all year plus an additional "spawning bypass flow" of 1200-1250 cfs when temperatures are between 38-50° F. A minimum bypass flow management plan to comply with Article 407 is contained in a separate document; however the two plans will be consistent with and integrated with the other.

The City proposes the attached Water Quality Management Plan consistent with Articles 406 and 407:

1. Using continuous recording instruments, the City will record hourly, the temperature, dissolved oxygen and pH to compute a daily average for each of these variables at five locations: upstream of Kaukauna Dam, downstream of the Badger powerhouse; in the Badger bypass reach; and also upstream and downstream of Rapide Croche dam and powerhouse.
2. Data collection (Table 1) will begin after the construction of the New Badger powerhouse currently estimated for February 2013. The City will notify you at least five days prior to the actual completion date of construction. The study will commence in February 2013 and conclude in February 2016 (three years) and include a final report with recommendation for future monitoring and management.
3. Temperature data collection will begin annually on February 1 at Kaukauna Dam to identify the start of spawning bypass flows (Article 407).

4. Data collection at the other four locations will begin on June 15 and will conclude annually on September 30 at all five locations (Table 1; Article 406).
5. Proposed sample sites are as follows: (1) forebay of Kaukauna dam at the existing reservoir elevation station; (2) approximately 300 yards downstream of the Badger powerhouse near the railway bridge and on Kaukauna Utilities Materials property; (3) in the bypass reach at a location to be determined during spring time discharge in the bypass reach; (4) upstream of Rapide Croche powerhouse at the trashbars near Unit 3; and (5) downstream of Rapide Croche powerhouse near the downstream end of the training wall on the south shore. Note that temperature at station (1) Kaukauna dam will be provided in real time to the Kaukauna Utilities Operations Center to enable real time response to managing spawning bypass flow (Article 407).
6. Calibration of the Dissolved Oxygen sensor will be performed every two weeks with a variance goal of less than 1 mg./l. 70% of the time.
7. Differences in upstream and downstream dissolved oxygen levels (daily averages) if greater than 2 mg./l. for five consecutive days will be reported to Wisconsin Department of Natural Resources (WDNR). Kaukauna will collaborate with WDNR to address the problem.
8. An annual report will be prepared each year and delivered to the agencies by December 15. The 2015 report will review all three years of data collection with recommendations on whether sampling protocols should be continued or revised.

Please contact the undersigned, Mike Pedersen at 920-462-0220 if you have questions. In order to meet FERC schedules, we request your comments by November 28, 2011 per FERC requirements and we will incorporate these into our submittal to FERC. In summary, our proposed schedule is:

- Request for agency comments **October 28, 2011**
- Agency responses by **November 28, 2011**
- Draft Plan submitted to FERC with agency comments by **December 28, 2011**
- FERC Approval of Plan by June 2012
- Preparation for implementation by December 2012
- Initiate Sampling February 2013
- Sample and report annually for three years (see Table 1)
- Final report and recommendations December 2015

Thank you for assisting the City of Kaukauna and your timely response.

Michael Pedersen
Mike Pedersen
Manager of Generation and Operations
Kaukauna Utilities

Attachment: Water Quality Management Plan, Badger – Rapide Croche Hydroelectric Project
Distribution List: (attached)

Table 1: Data Collection Locations and Schedules

Site Number	Description	Start Date	Stop Date	Off Season	Data Interval	Download Calibration
1	Kaukauna Dam	February 2013	September 30 2015	October 1 – January 31	Hourly: Daily Average[1]	2 Week Intervals
2	Badger Tailrace	June 15 2013	September 30 2015	October 1 – June 14	Hourly: Daily Average[1]	2 Week Intervals
3	Badger Bypass Reach	June 15 2013	September 30 2015	October 1 – June 14	Hourly: Daily Average[1]	2 Week Intervals
4	Rapide Croche Forebay	June 15 2013	September 30 2015	October 1 – June 14	Hourly: Daily Average[1]	2 Week Intervals
5	Rapid Croche Tailrace	June 15 2013	September 30 2015	October 1 – June 14	Hourly: Daily Average[1]	2 Week Intervals

Footnote 1: Temperature will be collected continuously in real time at Kaukauna Dam and monitored in Kaukauna Operations Center. Hourly data for all three variables (temperature, pH, and dissolved oxygen) will be reported in daily averages for comparisons among stations.

Distribution List:

Ms. Cheryl Laatsch
Water Management Specialist
WDNR, Office of Energy, GEF2, 7th Floor
101 S Webster Street
Madison WI 53707-7921
Phone: 608-219-0541
Email: Cheryl.laatsch@wisconsin.gov

Mr. Nick Utrup
U.S. Fish and Wildlife Service
2661 Scott Tower Drive
Green Bay, WI 54229-9565
Phone: 920-866-1717 or 920-866-1736
e-mail: NickUtrup@fws.gov

Ms. Peggy A. Harding, Regional Engineer
Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
230 S. Dearborn Street, Suite 3130
Chicago, IL 60604-1695
Telephone: 312-596-4438
Fax: 312-596-4460
Email: peggy.harding@ferc.gov

Water Quality Monitoring Plan
Badger – Rapide Croche Hydroelectric Project
FERC No. 2677-019
Kaukauna, Wisconsin

Introduction

This Plan consists of six sections as follows:

- Project Background
- Summary of Water Quality Certification Requirements
- Water Quality Criteria for the Project
- Elements of the Water Quality Plan Including Deliverables
- Schedule
- Contact Information

Project Background

In May 18, 2009, City of Kaukauna, Wisconsin (Kaukauna), received a new License from the Federal Energy Regulatory Commission (FERC) for its Badger-Rapide Croche Hydroelectric Project. The project consists of two separate developments, Badger and Rapide Croche both located on the Fox River. Badger is located within the City of Kaukauna and currently has two powerhouses. Rapid Croche is 4.5 miles downstream and consists of a single powerhouse integral with dam.

The two Badger Powerhouses are situated on the south side of the Fox River, 1,800 feet downstream of the 22-foot high U.S. Army Corp of Engineers (USACE) Kaukauna Dam. Water is bypassed from the main channel and diverted through a 2,100-foot-long power canal that bifurcates into two adjacent power houses known as Old Badger and New Badger. Combined installed capacity is 5.6 Megawatts (Mw). FERC approved the City's proposal to decommission these two facilities and replace them with a single modern powerhouse immediately upstream and increase Badger's installed capacity to 7 Mw. Expected completion date of the new Badger power house is February 2013.

In issuing its Water Quality Certification, the State of Wisconsin approved Kaukauna's Plans but stipulated 12 conditions that are incorporated into the FERC License. Specifically, Article 406 requires the City to submit a Water Quality Management Plan to FERC within one-year of the award of License. The Plan includes monitoring temperature, dissolved oxygen and pH upstream and downstream of the Badger Development (Kaukauna Dam and Powerhouse) and Rapide Croche Dam and Powerhouse to protect warmwater fisheries.

Article 407 requires the City to operate the project flows to deliver a minimum of 300 cfs via the spillway (natural channel) all year plus an additional "spawning bypass flow" of 1200-1250 cfs when temperatures are between 38-50° F. The Plan to comply with Article 407 is contained in a separate document; however, the Water Quality Plan will be consistent with and integrated with the Bypass Flow Management Plan.

Rapide Croche Hydroelectric development is located 4.5 miles downstream of the Badger development on the south bank of the Fox River. Unlike the Badger development, the 2.4 Mw Rapide Croche powerhouse is integral to the 20-foot high USACE Rapide Croche Dam. With Badger, the combined capacity of the new project will be 9.4 Mw.

The Fox River is regulated by USACE at Lake Winnebago primarily for flood control but also other purposes. At times, flows in the Fox River may fluctuate as it passes multiple dams affecting instantaneous inflows and outflows to the intervening projects. The License requires Kaukauna to manage this as best possible and report deviations from normal operations.

Based on aerial photos and a site reconnaissance on September 20, 2011 by Kaukauna Utilities and their consultant, GEI Consultants, a set of proposed sampling locations were developed to meet the Water Quality Management Plan. Sites were selected based on the following criteria: (1) meets the intent of the Water Quality Certification and criteria; (2) is secure from vandalism; (3) would obtain a continuous flow of water representative of the inflow or discharge above and below the project features; (4) would present safe sampling conditions (5); would not likely encounter severe depth variations such that probes could not be accessed under variable discharges; (6) would be less susceptible to sediment / bedload movement and bio-fouling.

Summary of Water Quality Certification Requirements

FERC included the State of Wisconsin Water Quality Certification (Appendix A) in the May 18, 2010 License Order. It requires Kaukauna Utilities to meet the most current water quality standards adopted under s. 281.15, Wisconsin Statutes and 33 USC 1313, as well as any revised water quality standards that may be adopted over the term of the license. According to Wisconsin Department of Natural Resources (WDNR), the proposed project if constructed in accordance with the provisions of this certification will not adversely affect water quality, will not increase water pollution in surface waters and will not cause environmental pollution as defined in s.283.01(6m), Wisconsin Statutes and will be in compliance with sections 301, 302, 303, 306, and 307 of the Federal Clean Water Act, P.L 92-500, as amended, and other appropriate requirements of state law.

According to Wisconsin Department of Natural Resources (WDNR), the existing hydraulic capacity for the Badger Development is 3,096 cfs. Kaukauna Utilities proposes to increase capacity at this project to 5,260 cfs through two identical generating units, each with a capacity of 2,630 cfs. WDNR shall not oppose this increased capacity considering the improvements to these projects outlined in this water quality certification.

FERC agreed with WDNR and stipulated in the new license: The licensee shall develop within 1 year of issuance of the FERC license, a Water Quality Monitoring Plan that describes the methodology used to conduct periodic water quality monitoring in accordance with a schedule approved by WDNR. FERC also stipulated Kaukauna to consult with U.S. Fish and Wildlife Service (USFWS).

WDNR classifies all surface waters into one of five fish and aquatic life subcategories. The impounded and free-flowing reaches of the Fox River upstream and downstream of the Badger and Rapide Croche

Hydroelectric developments are classified as warmwater fish communities. This subcategory includes surface waters capable of supporting a community of warmwater sport fish or serving as a spawning area for warmwater sport fish. The WDNR is concerned about maintaining minimum flows in the natural channel downstream of Kaukauna Dam and run of river conditions at both projects such that at any time, inflow approximately equals outflow at both projects.

To improve warmwater fish habitat in the bypassed reach, FERC approved a minimum flow of 300 cfs during all months of the year; with an additional 1200 to 1250 cfs to be released whenever river temperatures are between 38 and 50 ° F, during walleye spawning season (typically March and April) bringing the bypass discharge to 1500 to 1550 cfs at this time (Article 407).

Kaukauna is in the process of installing a temperature monitoring station at Kaukauna Dam forebay that relays information in real time to their Operations Center. This will enable them to manage bypass flows during spawning season.

Inflow and outflow of the project is equilibrated by maintaining a full pool elevation at the flashboards of Kaukauna Dam. A float gage at the south end of Kaukauna Dam enables the Operation Center to maintain a constant pool elevation in near real time. They make adjustments with hydro operations or spillway gate settings to adjust for inflow changes. Because the Operations Center knows the hydraulic capacity of the new units, they will be able to adjust the units downward in the spring to pass the required flows in the bypass reach. They will also have a known taintor gate setting calibrated to a spillbay discharge rating curve enabling them to set spawning flows. Kaukauna also plans to include a minimum flow hydropower unit at the dam which has the capacity to generate power with the required minimum flow of 300 cfs. Finally, per Article 407, Kaukauna will establish staff gages in the tailrace of the bypass channel and tailrace. It is at this same location that Kaukauna also proposes to monitor inflow levels dissolved oxygen and pH also required by the Water Quality Certificate and FERC.

Water Quality Criteria for the Project

WDNR has established that, except for natural conditions, all waters classified for fish and aquatic life, subcategory warmwater fish communities shall meet the following criteria (Chapter NR 102.04, Wisconsin Administrative Code):

> **Dissolved Oxygen** - The dissolved oxygen content in surface waters may not be lowered to less than 5 milligrams per liter (mg/l) at any time.
>
> **Temperature** - There shall be no temperature changes that may adversely affect aquatic life. Natural daily and seasonal temperature fluctuations shall be maintained. The temperature shall not exceed 89° F for warmwater fish.
>
> **pH** - The pH shall be within the range of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.
>
> **Instream Flows** - Kaukauna Utilities shall develop, within 1 year issuance of the FERC license, a compliance plan for flow delivery and flow monitoring in the spillway channel at both projects,

including: 1) installation of staff gage showing each reservoir operating the spillway channel to document the minimum flow agreed upon; and 2) automatic water level recorders to record headwater and spillway channel elevations and flow releases through the power houses and spillways. Kaukauna Utilities does not propose to modify operations at the Rapide Croche project and WDNR shall not require any changes beyond replacement of the trash racks and recreational improvements described above. Kaukauna Utilities proposed and WDNR approved the new powerhouse at the Badger development.

Elements of the Water Quality Plan Including Deliverables

The City proposes the following Water Quality Plan that is consistent with Articles 406 and 407 of the FERC License, FERC No. 2577-019 and Appendix A of that document, the WDNR Water Quality Certification Conditions issued February 17, 2011 as follows:

1. Using continuous recording instruments, the City will record hourly, the temperature, dissolved oxygen and pH to compute a daily average for each of these variables at five locations: upstream of Kaukauna Dam; downstream of the Badger powerhouse; in the Badger bypass reach; and also upstream and downstream of Rapide Croche powerhouse (Map Figure 1a).
2. Data collection (Table 1 – Cover Letter) will begin after the construction of the New Badger powerhouse (estimated for February 2013); the City will notify WDNR at least five days prior to the actual completion date of construction. The study will commence in February 2013 and conclude in February 2016 (three years) and include annual reports in the first two years and a final report with recommendation for future monitoring and management in the third year.
3. Temperature data collection will begin annually on February 1 at Kaukauna Dam to identify the start of spawning bypass flows (Article 407). Data collection for pH and dissolved oxygen will commence on June 15 at this location.
4. Data collection at the other four locations for temperature, pH and dissolved oxygen will begin on June 15 and all data collection will conclude annually on September 30 at all five locations (Table 1-Cover Letter).
5. Details of sample sites are as follows: (1) in addition to the float sensor and continuous temperature sensor in the forebay of Kaukauna dam, Kaukauna will install a Hach Sonde Model MS-5 or equivalent with pH probe and dissolved oxygen probe. The unit will also contain a backup temperature probe to the real time data probe. The data will be stored onboard the unit and downloaded at two-week intervals; calibration on the DO probe will be performed and battery life checked at each visit. Similar instrumentation and procedures will be included at four additional sites as follows: (2) approximately 300 yards downstream of the Badger powerhouse near the railway bridge and on Kaukauna Utilities Materials property (water from the power plant is well mixed at this location); (3) in the lower bypass reach at a site to be determined during spill conditions in 2012; (4) upstream of Rapide Croche powerhouse at the trashbars near Unit 3; and (5) downstream of Rapide Croche powerhouse near the downstream end of the training wall on the south shore approximately 100 feet from the powerhouse discharge.

6. Calibration of the dissolved oxygen sensors will be performed every two weeks with a variance goal of less than 1 mg/l 70% of the time.
7. Differences in upstream and downstream dissolved oxygen levels (daily averages) if greater than 2 mg/l for five consecutive days will be reported to WDNR during the sampling season and a plan to address the problem will be developed in consultation with the agency.
8. An annual report will be prepared each year for three years and delivered to the agencies by December 15. The final 2015 report will review all three years of data collection with recommendations on whether sampling protocols should be continued or revised. The reports will contain summary statistics and graphics that compare and display hourly data; quality assurance analysis including calibration of instruments; description of problems encountered with data collection, instrumentation and missing or anomalous data. The discussion will summarize any out-of-bounds criteria encountered during the season and any communications that occurred with agency personnel and Kaukauna Utilities.
9. Each annual report will be completed and submitted to the WDNR and FERC by December 31 of the year in which the data were collected along with any recommendations for modifications of the sampling protocols for the following year and the basis for such recommendations.
10. Copies of the downloaded data will be secured in two separate locations to reduce chances for data loss. Raw data will be available upon request and provided in electronic format. Kaukauna and its consultants will be available for agency comments after each report is submitted.

Schedule

The proposed schedule is:

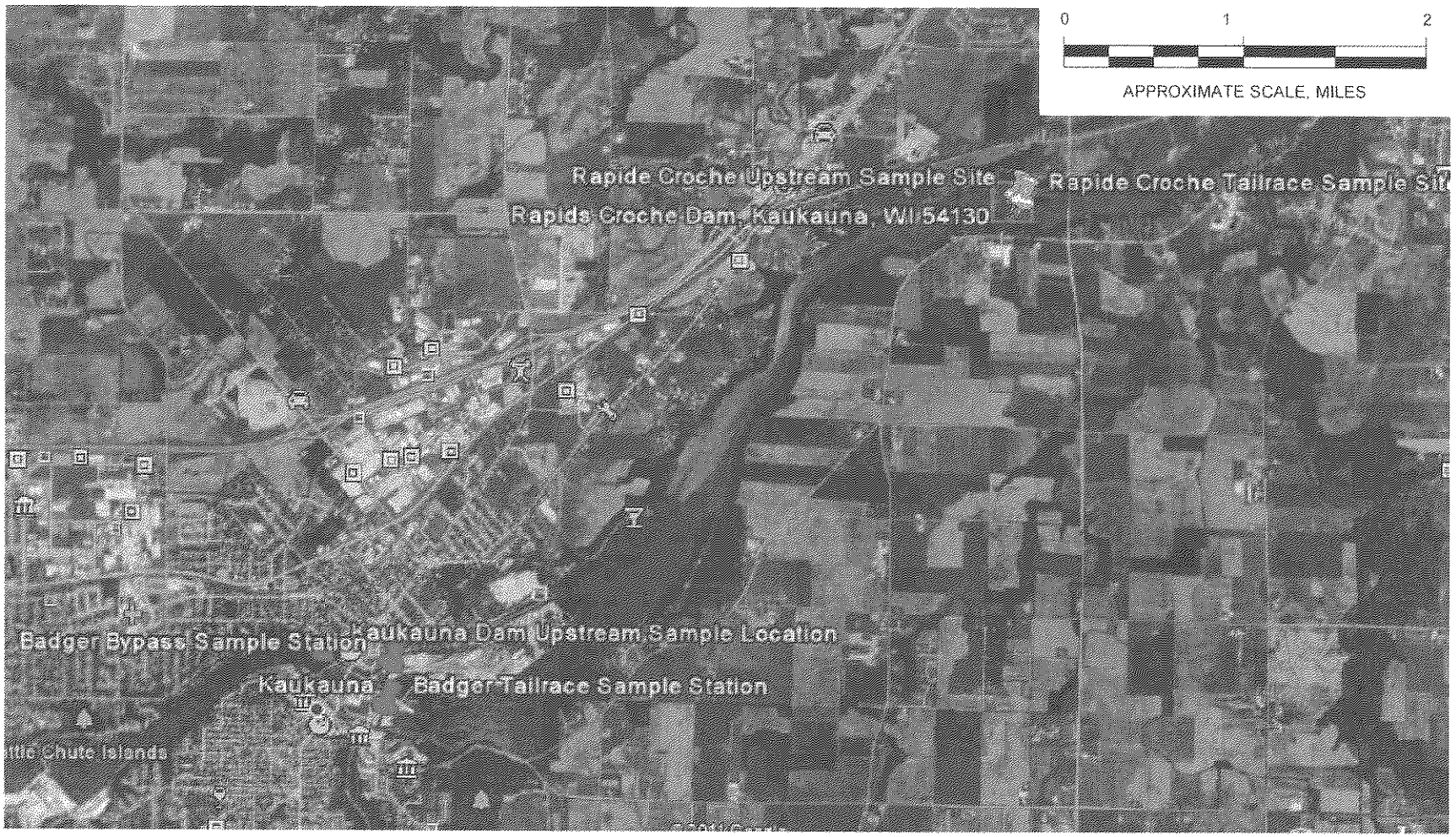
• Request for agency comments to the draft Plan	October 28, 2011
• Agency responses to Draft Plan	November 28, 2011
• Draft Plan submitted to FERC with agency comments	December 28, 2011
• FERC Approval of Plan	June 2012
• Preparation for Implementation Complete	December 2012
• Initiate Sampling	February 2013
• Sample and report annually for three years	February 2013-2015
• Final Report and Recommendations	December 2015

Contact Information

The responsible organization is Kaukauna Utilities located at :

777 Island Street
P.O. Box 1777
Kaukauna, WI 54130-7077
Phone 920-766-5721
Email kumail@ku-wi.org
Michael Pedersen, Manager of Generation and Operations

Figures 1a, 1b and 1c show details of proposed sampling locations (attach here).



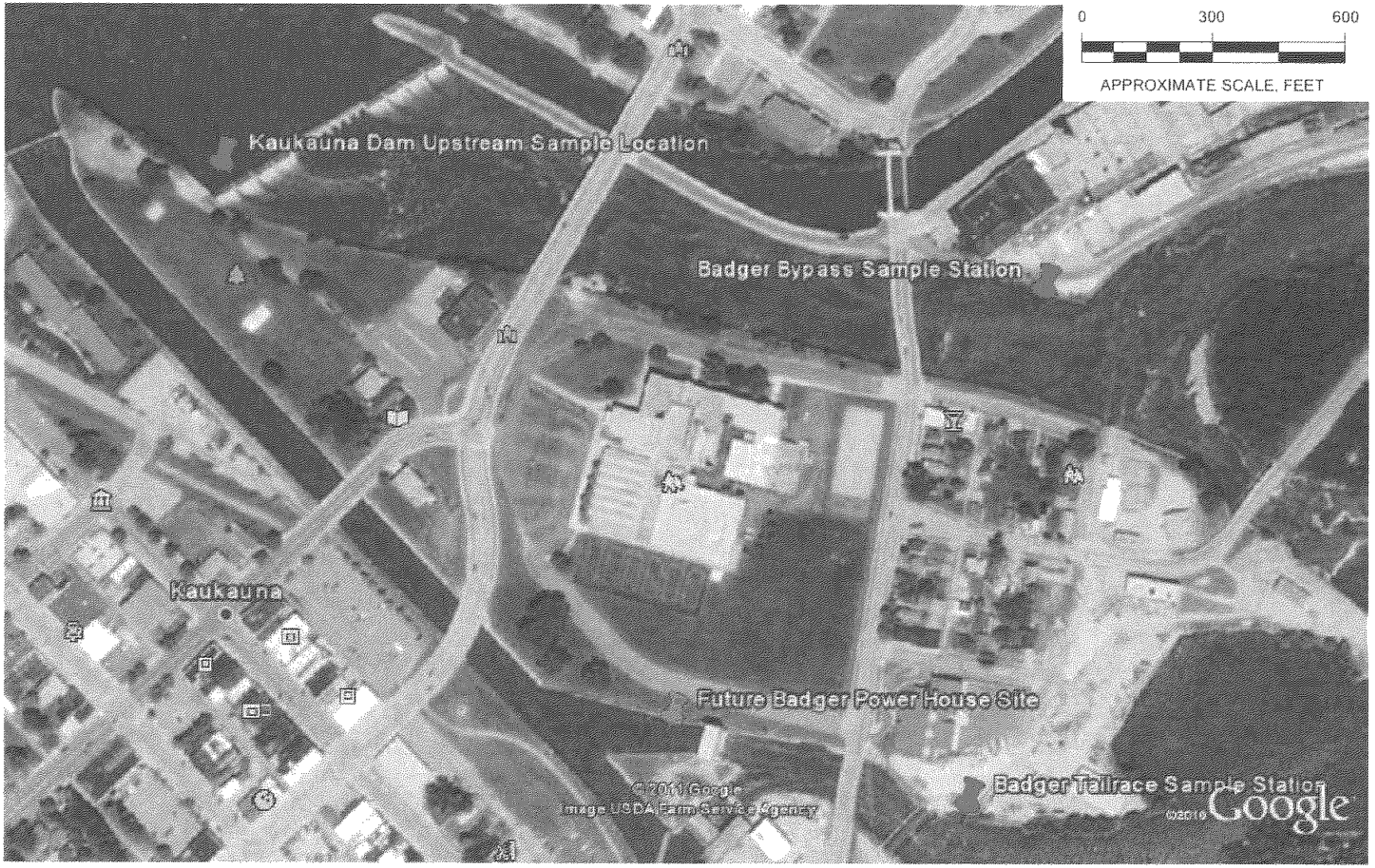
LEGEND:

SAMPLING LOCATIONS – BADGER

SAMPLING LOCATIONS – RAPIDE CROCHE

NOTE: BASED ON A 2008 AERIAL PHOTOGRAPH

Badger Hydroelectric Project	GEI Consultants	WATER QUALITY SAMPLE LOCATION OVERVIEW
Kaukauna, Wisconsin	Project 115340	September 2011 Figure 1a



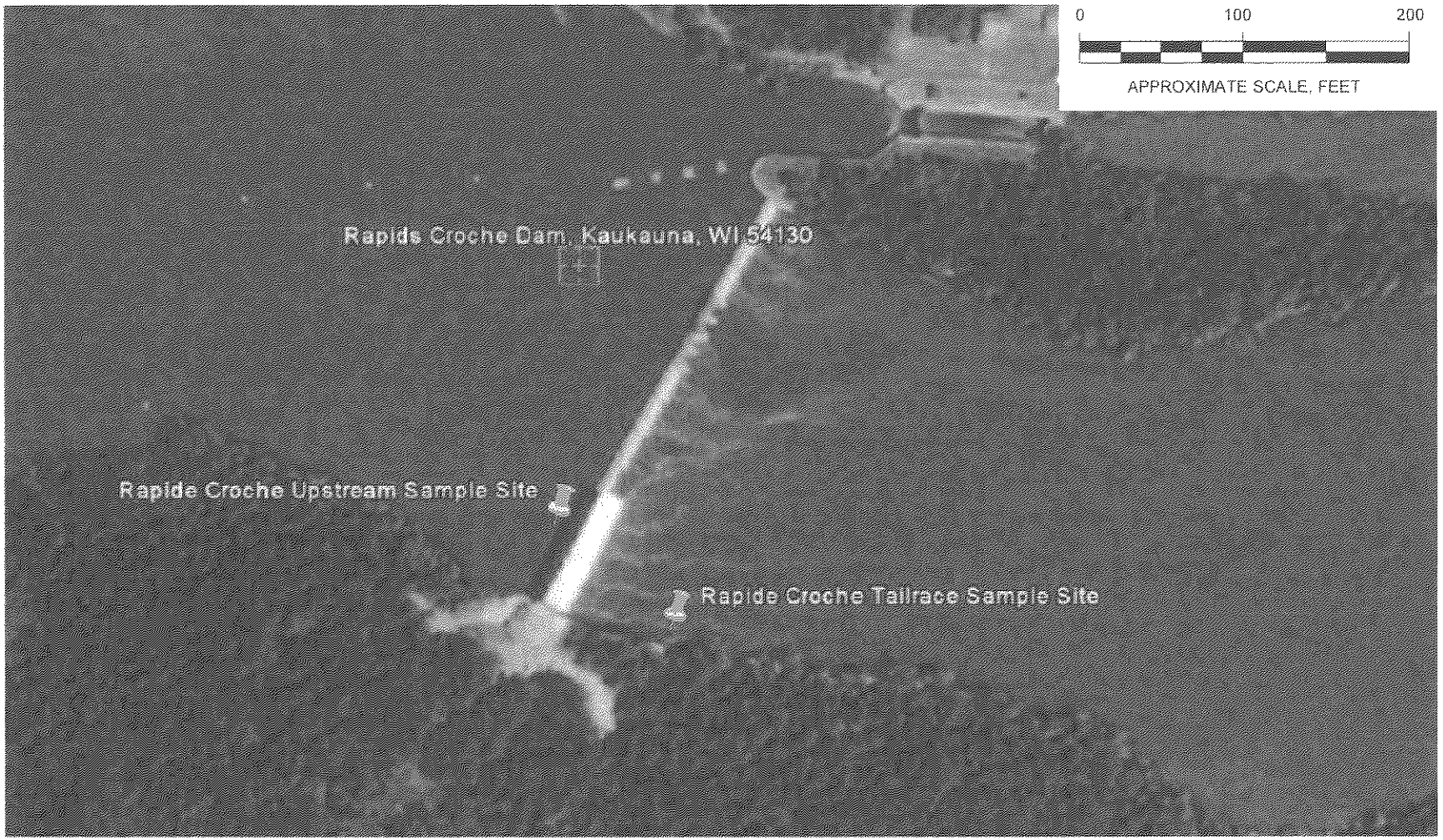
LEGEND:

SAMPLE LOCATIONS – BADGER

NOTE:

1. BASED ON A 2010 AERIAL PHOTOGRAPH

Badger Development	GEI Consultants	WATER QUALITY SAMPLE LOCATIONS
Kaukauna, Wisconsin	Project 115340	September 2011 Figure 1b



LEGEND:

SAMPLE LOCATIONS – RAPIDE CROCHE

NOTE: BASED ON A 2008 AERIAL PHOTOGRAPH

Rapide Croche Development	GEI Consultants	WATER QUALITY SAMPLE LOCATIONS
Fox River, near Kaukauna, Wisconsin	Project 115340	September 2011 Figure 1c