

Michael Schmoller  
Wisconsin Department of Natural Resources  
South Central Region  
3911 Fish Hatchery Road  
Fitchburg, WI 53711

Subject:

Northern Well Installations Work Plan, Madison-Kipp Corporation, 201 Waubesa Street, Madison, Wisconsin. Facility ID No. 113125320, BRRTS No. 02-13-001569

Dear Mr. Schmoller:

On behalf of the Madison-Kipp Corporation, a *Site Investigation and Interim Actions Report, February 2012 – January 2013* (SI Report) was submitted to the Wisconsin Department of Natural Resources (WDNR) on March 15, 2013, for the facility located at 201 Waubesa Street (Site) (ARCADIS, 2013). The WDNR prepared a response letter to the SI Report dated June 20, 2013 (WDNR, 2013). On July 8, ARCADIS met with the WDNR to discuss the response letter and review the locations of the monitoring wells proposed in the June 20, 2013 WDNR letter. As requested by the WDNR at the July 8 meeting, this work plan provides a summary of drilling and well installation activities for four wells located north of the Site.

### Investigation Work Plan

The following sections present a description of the work to be completed north of the Site as requested in the WDNR June 20, 2013 letter.

#### Proposed Well Locations

Four additional wells will be installed to further evaluate the horizontal and vertical extents of groundwater impacts off Site (Figure 1). The following is an overview of locations that were agreed to at the July 8, 2013 meeting.

- One water table well will be located north of the Site in the Goodman Community Center parking lot to delineate the extent of groundwater impacts in the unconsolidated soils.
- Two boreholes will be advanced near the intersection of Waubesa Street and Milwaukee Street. In the first borehole, one water table well will be installed in the unconsolidated soils. Two wells will be installed in the second borehole with

Imagine the result

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WI001283.0006

one screen in the Lone Rock Formation and one screen in the Wonewoc Formation.

It should be noted that the proposed well locations depicted on Figure 1 are approximate and may need to be modified in the field based on impediments such as underground and aboveground utilities, terrace vegetation, and adequate room to work safely. WDNR will be notified of the final location prior to borehole advancement.

### **Drilling and Sampling**

Below is a summary of the proposed drilling, well installation, conductivity testing, and groundwater sampling activities.

#### **Soil and Rock Drilling**

The boreholes will be advanced using hollow stem auger drilling in the unconsolidated soils and mud rotary drilling in the bedrock. Below is a summary of the soil and rock sampling methodology.

Soil samples will be collected at 2-foot intervals using split spoons from ground surface to the top of the water table from the two boreholes that will be converted to water table wells. The soils will be field screened for the presence of volatile organic vapors using a photoionization detector (PID) and the characteristics will be logged. Three soil samples will be collected from the two boreholes including one soil sample from the 2-foot interval with the highest PID reading from 0 to 4 feet below land surface (bls), one soil sample from the highest PID reading from 8 to 12 feet below land surface, and one soil sample from above the water table. The soil samples will be collected and placed in laboratory-supplied containers on ice for transport to TestAmerica in University Park, Illinois analysis of volatile organic compounds (VOCs) using Method 8260 and polycyclic aromatic hydrocarbons (PAHs) using Method 8270.

The bedrock borehole will be blind drilled from ground surface to an estimated depth of 230 feet bls. Once bedrock is encountered, an 8-inch temporary casing will be set approximately 5 feet into competent bedrock. The bedrock will be blind drilled using mud rotary drilling methods.

### Vertical Aquifer Profiling

Vertical aquifer profiling will be completed at the proposed bedrock borehole location using a “top-down” sampling approach. Groundwater samples will be collected as the borehole is advanced using a single or double packer. This “top-down” sampling approach limits vertical migration and in-hole mixing of groundwater. Vertical aquifer profiling is a method used to determine the vertical extent of groundwater impacts by sampling discrete intervals. The purpose of the packer system is to limit the flow of groundwater from above and below the desired sampling interval, so that a discrete interval of the borehole may be tested. Packer tests provide a means of assessing the hydraulic yield of the test zone, and of collecting groundwater samples for laboratory analysis. After pumping water from the sample interval to remove the effects of the drilling activities, a water sample will be collected from the interval.

Groundwater samples will be collected every other 10-foot interval from the base of the temporary casing (estimated 40 feet bls) to 200 feet bls and every 10-foot interval from 200 to 230 feet and submitted to TestAmerica for laboratory analysis of VOCs. The groundwater samples will be placed in laboratory-supplied containers. The containers will be placed in a cooler with ice for transport to the analytical laboratory. Groundwater samples will be submitted for analysis of VOCs by Method 8260 for expedited (3 working day) turnaround time. The groundwater analytical data will be used to aid in selecting screen intervals in the Lone Rock and Wonewoc Formations.

### Geophysical Logging

Down-hole geophysical logging will be completed at the bedrock well location up to approximately 230 feet. Multiple geophysical logging tools will be utilized including gamma, fluid temperature, fluid resistivity, caliper, heat-plus flowmeter, and high resolution acoustic and optical borehole viewers. The purpose of geophysical logging is to determine the locations and thickness of formations and fractures and identify the less and more permeable water-bearing zones where contaminant flow exists. The groundwater analytical results and geophysical logs will aid in determining where the predominant groundwater flow in the fractures is present.

### Temporary Blank Liner Installation

A FLUTE blank liner may be temporarily installed in the one bedrock borehole to limit vertical migration and in-hole mixing.

### **Well Installations and Development**

The two boreholes advanced and sampled in the unconsolidated soils will be converted to water table wells (MW-26S, MW-27S). After the bedrock borehole is advanced, sampled, and logged using geophysical methods, the groundwater analytical and draft geophysical data will be evaluated. Recommendations for screen intervals in the Lone Rock and Wonewoc Formations will be provided to the WDNR for review and approval.

Based upon the WDNR-approved screen intervals, two wells will be installed in the borehole (MW-27D and MW-27D2). The wells will be constructed and developed in accordance with NR 141 Wis. Adm. Code. A 5- or 10-foot, 0.010-inch, Schedule 80 polyvinyl chloride screen and riser will be installed. The four wells will be completed at the surface with a flushmount well compartment set in concrete. The wells will be developed to minimize sediment, drill cuttings and drilling fluids in accordance with NR 141 Wis. Adm. Code.

### **Hydraulic Conductivity Testing**

In-situ hydraulic conductivity testing will be completed at the four new well locations, MW-25D, and MW-25D2. The testing will be completed using baildown and pneumatic test methods. The purpose of hydraulic conductivity testing is to measure the ability of the rock to transmit water when subjected to a change in hydraulic gradient. The testing will also provide a second means to evaluate whether existing wells are screened in low or high transmissivity portions of the aquifer (e.g., whether bedrock wells screen fractured or unfractured intervals of rock).

### **Groundwater Sampling**

Groundwater samples will be collected using low-flow sampling techniques from the four new wells. Low-flow sampling techniques consist of purging the groundwater at a low-flow rate until a set of field parameters stabilize. Low-flow sampling techniques are used to collect representative water samples in the formation adjacent to the well screen while 1) reducing water turbulence which may unnecessarily volatilize contaminants; 2) reducing turbidity levels that may bias analytical results high, and 3) reducing the volume of water requiring management.

Groundwater samples will be submitted for laboratory analysis of VOCs for standard (10 working day) turnaround time. All containers and preservatives will be obtained directly from the analytical laboratories. Immediately after collection, the sample containers will be placed in a cooler with ice until shipment to the appropriate

laboratory can be arranged. Standard chain-of-custody procedures will be followed throughout sample collection, storage, and shipment.

### **Surveying**

A Wisconsin-licensed surveyor will locate the horizontal location to Wisconsin state plane coordinates and vertical elevation for the proposed bedrock borehole location. The bulk of the contaminant mass identified previously at Monitoring Wells MW-3D3 and MW-5D3 was confirmed to a maximum depth of 160 ft bls. It was agreed upon at the technical meeting with the WDNR held on August 23, 2012 to complete vertical aquifer profiling to 200 feet in order to sample below the location with the potential highest contaminant mass. Due to topographic changes in the area, the location and elevation of the proposed bedrock borehole will be surveyed to confirm the location is drilled to an elevation located between 667 feet (200 ft bls at MW-3D3) and 672 feet (200 ft bls at MW-5D3) above mean sea level. The horizontal locations and vertical elevations of the four new wells will be surveyed again after installation.

### **Investigative-Derived Waste**

Soil cuttings generated during the soil boring advancement will be containerized in appropriate roll-off containers. Water generated during soil boring advancement, sampling activities, and wash water generated during the cleaning of down-hole equipment will be containerized in polyethylene storage tanks. Arrangements will be made with a licensed disposal facility for the transportation and disposal of the wastes.

### **Reporting**

A documentation letter will be prepared summarizing the investigation activities, sampling results, and conclusions for submittal to WDNR.

### **Proposed Schedule**

Following approval from the WDNR, a schedule for the commencement of the investigation activities will be determined based on availability of the multiple subcontractors, acquiring access agreements and permits, and weather conditions. The water table well proposed in the Goodman Community Center parking lot is tentatively scheduled to commence on August 20.

**References**

ARCADIS. March 2013. Site Investigation and Interim Actions Report February 2012-January 2013.

WDNR. June 2013. Review of March 2013 Madison Kipp Site Investigation and Interim Actions Report February 2012 – January 2013.

ARCADIS U.S., Inc.



Toni Schoen  
Senior Geologist

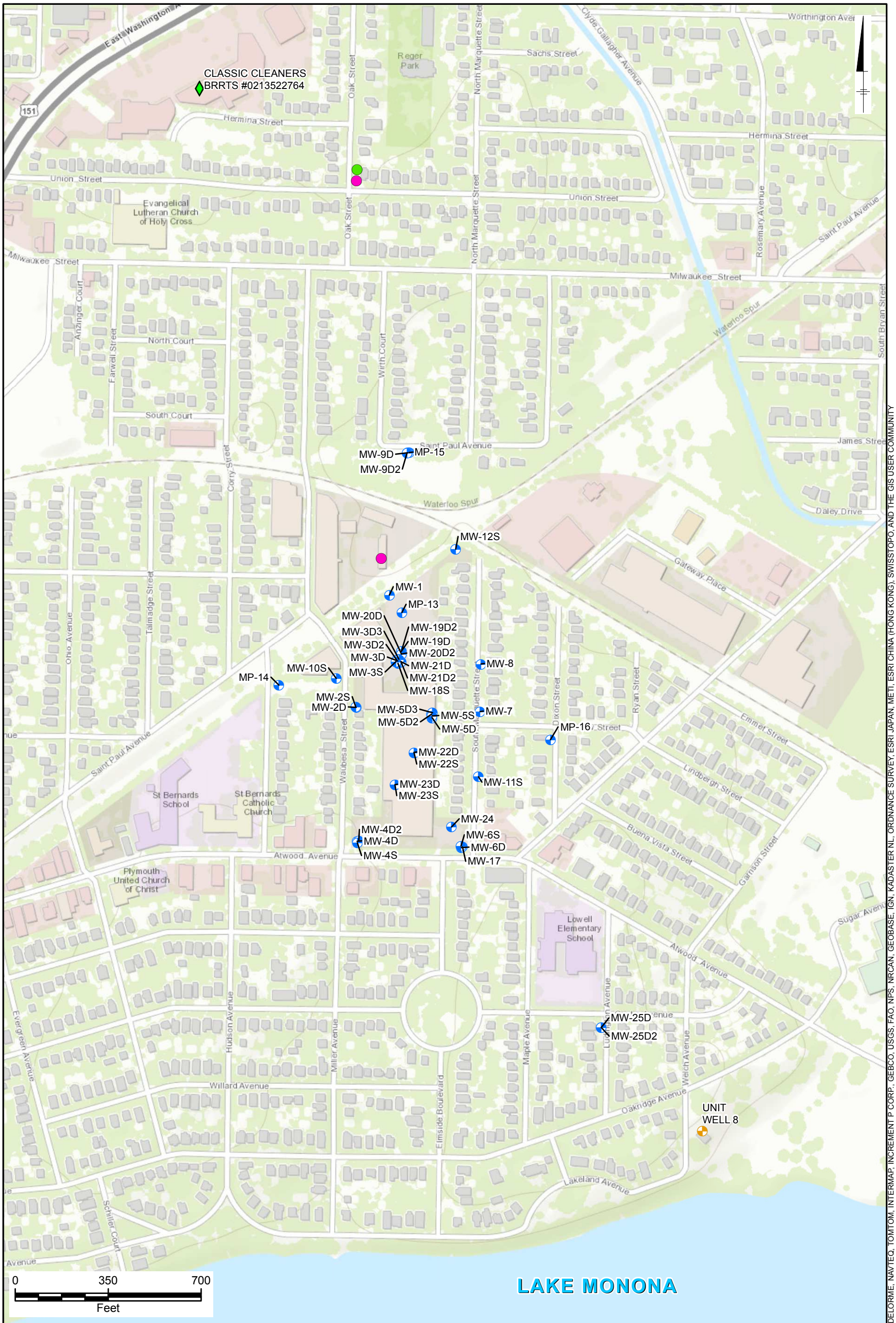


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- LEGEND**
- PROPOSED PIEZOMETER BEDROCK WELL LOCATION
  - PROPOSED UNCONSOLIDATED MONITORING WELL
  - ◆ CLOSED SITE (COMPLETED CLEANUP)
  - MUNICIPAL UNIT WELL 8
  - MONITORING WELL

MADISON-KIPP CORPORATION  
 201 WAUBESA STREET  
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**NORTHERN WELL INSTALLATIONS WORK PLAN**

**PROPOSED WELL LOCATIONS MAP**

**ARCADIS** | **FIGURE 1**

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