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June 30, 2020

Mr. John Feeney  
Wisconsin Department of Natural Resources  
1155 Pilgrim Road  
Plymouth, WI 53073

Subject: Site Investigation Workplan  
Lime Kiln Landfill and West Plume Area  
Village of Grafton, Wisconsin  
BRRTS Activity # 02-46-000743 and 02-46-549906  
TRC No. 383236.0000

Dear Mr. Feeney:

On May 27, 2020, TRC Environmental Corporation (TRC) and the Village of Grafton (Village) participated in a conference call with the Wisconsin Department of Natural Resources (WDNR) regarding the Lime Kiln Park Landfill (BRRTS activities #02-46-000743 and #02-46-549906) located in the Village of Grafton, Wisconsin.

TRC, on behalf of the Village of Grafton, has developed this work plan to complete a shallow groundwater assessment for the Manchester Drive and Green Bay Road residential areas near the Lime Kiln Landfill Site in response to vapor intrusion concerns expressed by the WDNR.

## Background

The Lime Kiln Landfill/West Plume area is located near Lime Kiln Park, within the limits of the Village of Grafton, Ozaukee County. The Milwaukee River borders the south and east edges of the park, while residential areas border the northeast, west, and southwest sides of the Park, as well as the east side of the Milwaukee River. Industries and businesses are located west, north, and northwest along Wisconsin Avenue.

The Village has completed almost 25 years of investigation and monitoring for the plumes associated with the two BRRTS sites (activities #02-46-000743 and #02-46-549906). Two groundwater plumes emanate from two distinct sources and mix beneath the Manchester Drive area. The Village is currently the Responsible Party for addressing both sites.

In a May 1, 2019 letter to the Village of Grafton, the WDNR requested a vapor intrusion screening of the Manchester Drive subdivision and homes along Green Bay Road due to the trichloroethylene (TCE) NR 140 Enforcement Standard exceedance at well MW-8A. On July 2, 2019, AECOM provided a limited vapor intrusion assessment to the WDNR, in which it recommended that three properties be sampled for vapor intrusion: 1767, 1749, and 1741 Manchester Drive. The WDNR has since requested a similar assessment along Green Bay Road. Due to the current COVID-19 pandemic social distancing restrictions, rather than enter residential homes to collect sub-slab vapor samples, TRC proposes to install temporary groundwater monitoring wells at the water table near these properties to evaluate the potential vapor intrusion risk.

The WDNR's original request for a vapor investigation was based on incorrect information that indicated MW-8A was a water table well. Measuring the VOC concentrations in groundwater at the

Mr. John Feeney  
Wisconsin Department of Natural Resources  
June 30, 2020  
Page 2

water table will provide data to determine if subsequent vapor intrusion investigation work is needed or if the vapor intrusion pathway can be ruled out without further sampling.

## **Purpose and Scope**

TRC, on behalf of the Village of Grafton, has developed this work plan to assist the Village of Grafton with completing a shallow groundwater assessment for the Manchester Drive and Green Bay Road residential areas near the Lime Kiln Landfill Site in response to vapor intrusion concerns expressed by the WDNR. The results of this investigation will dictate whether additional investigation or remediation is required to address the environmental impacts.

## **Site Information**

### **Site Address**

Lime Kiln Park – Grafton Vil, BRRTS #02-46-000743  
Green Bay Rd & Falls Rd.  
Grafton, Ozaukee County, WI 53024  
SW ¼ of NE ¼ of Section 25, T10N, R21E  
Lat. 43.3051265, Long. -87.9543264  
Parcel ID #100400076000

Grafton Lime Kiln Park, BRRTS #02-46-549906  
Green Bay Rd & Falls Rd.  
Grafton, Ozaukee County, WI 53024  
NE ¼ of NW ¼ of Section 25, T10N, R21E  
Lat. 43.305937, Long. -87.9550536  
Parcel ID #100400076000

### **Responsible Party**

Village of Grafton  
Amber Thomas, PE  
Director of Public Works/Village Engineer  
675 North Green Bay Road  
Grafton, WI 53024  
AThomas@Village.Grafton.wi.us  
(262) 375-5325

### **Environmental Consultant**

TRC Environmental Corporation  
Marita Stollenwerk, Senior Project Manager  
150 N Patrick Boulevard, Suite 180  
Brookfield, WI 53045  
MStollenwerk@trccompanies.com  
(262) 328-4528

## Geology & Hydrogeology

The following conceptual hydrogeologic model was previously provided in AECOM's *2014 Progress Report* for the Lime Kiln Landfill:

The area's conceptual groundwater flow model consists of thin unconsolidated glacial deposits and fill which overlie an unconfined dolomite bedrock aquifer. The dolomite aquifer contains lithologic changes, and individual hydrostratigraphic units were classified as aquifers or aquitards. The vertical extent of the conceptual model is bounded by a lower permeability aquitard.

The Silurian-age dolomite aquifer is comprised of undifferentiated Racine Formation and the Romeo beds of the Racine Formation. The aquifer extends approximately 200 feet below the top of bedrock, coincident with the contact of the underlying Waukesha Formation. The Waukesha Formation is designated as an aquitard because it is fine-grained and unweathered.

Northwest of the Park, the water table is approximately 15 to 20 feet below the ground surface. At the landfill, the water table is approximately 20 feet below ground surface, saturating the lower portion of the waste in the landfill.

The Milwaukee River forms the eastern boundary of the Park. The reach of the river immediately adjacent to and south of the park is higher than the water table. Water, therefore, flows from the river bottom to the aquifer.

Local flow in the vicinity of the site is less pronounced than the regional flow. Groundwater in the uppermost aquifer (Racine Formation including the Romeo beds) is considered part of the regional flow system with a recharge area encompassing the site, as well as topographically high areas west of the site. Longer flow paths and discharge to Lake Michigan located about 2.5 miles to the east of the site also characterize the regional flow system.

Once water reaches the water table, flow is controlled by the hydraulic head in the units as shown by water levels in wells surrounding the site. The downward gradients at the site are consistent with the site's position within a recharge area as evidenced by vertical gradients observed in the investigation report.

Groundwater flow is controlled primarily by the bedrock structure and the regional discharge to Lake Michigan. In highly transmissive zones (higher hydraulic conductivity), advective contaminant transport within the aquifer yields a narrow, horizontal plume, as seen downgradient of the Lime Kiln site.

The regional groundwater flow pattern may also be influenced by public and private water supply wells in the area. The Village of Grafton has seven water supply wells that pump groundwater. Two wells with limited usage are located upgradient of Lime Kiln Park. Private residence wells outside the Village limits also withdraw groundwater and may affect groundwater flow.

## Proposed Scope of Work

The investigation work completed to date has been focused on deep portions of the groundwater plumes associated with these two BRRTS activities. Further investigation is needed to define the degree of VOC contamination at the water table to evaluate potential vapor impacts overlying the plumes.

## Sample Locations

The proposed work includes four temporary wells. Proposed locations are shown on Figure 1. The proposed sampling locations are near residential properties along both Manchester Drive and Green Bay Road within the public right-of-way. As such, slight changes to the proposed sampling locations may be required in the field due to potential conflicts with subsurface utilities within the rights-of-way.

## Groundwater Sampling

Install four driven well point samplers to approximately 50 to 60 feet below ground surface (bgs) (or approximately 5 feet below the water table) with a Geoprobe using the Screen Point 16 (SP-16) groundwater sampling tool. Depth to water table is estimated at approximately 55 feet bgs. This methodology uses direct push technology to push an in-situ sampler to the desired depth and obtain a groundwater sample.

**TRC requests WDNR approval for shallow groundwater sampling in accordance with Wis. Admin. Code NR 141.29.** Additional information on the well construction details and the rationale for using the SP-16 temporary wells to achieve investigation goals is provided below:

### *Temporary Well Construction*

- The geoprobe will drive 1.6-inch outer diameter protected screen sheath 50 to 60 feet bgs (or approximately 5 feet below the water table).
- Upon reaching the desired depth, the screen sheath will be released, and the outer casing retracted, deploying a 36-inch long stainless-steel screen with a 0.004 inch (0.10 mm) standard slot size.
- A groundwater sample will be collected using a check valve assembly using polyethylene tubing oscillated up and down to obtain water for sampling.
- The plug at the lower end of the screen will be removed and the borehole will be sealed with grout as the sampler is extracted.
- The sampler will be decontaminated and reused at the next location.

An exemption is requested from NR 141 well construction, diameter, and development requirements in order to obtain data from the shallow water zone quickly.

### ***Temporary Well Rationale***

- The traffic and roadway maintenance operations along the Manchester Drive and Green Bay Road rights-of-way increase risk of damage to permanent wells. Abandoning sampling points during the same mobilization minimizes impact on roadway operations and risk of damage to wells.
- SP-16 temporary wells produce quality data to evaluate contaminant conditions in shallow groundwater quickly and within a reasonable cost. Due to the subsurface lithology in the Village comprised of glacial till, use of the small diameter SP-16 tool is recommended in this lithology rather than installation of 1-inch diameter temporary wells, as the small diameter rod is more likely to probe deeper than pushing a larger diameter rod with filter pack. SP-16 is likely the fastest and most cost-effective technology to answer the immediate question of shallow groundwater impacts without the risk of entering residential properties during the global pandemic. The cost of installation of permanent NR 141 compliant shallow wells using hollow stem augers would be 5 to 6 times more expensive per location than use of the SP-16 groundwater sampling tool.
- Significant fluctuations in groundwater concentrations are not anticipated given the time elapsed since the chemical releases; therefore, one round of data can be used to make assessment of water table impacts in this area.

### ***Temporary Well Sampling***

- Depth to water will be measured prior to collection of groundwater samples from each well.
- The well will also be purged using low-flow purging methods. Water extraction using a Wattera pump is needed due to the small diameter of the SP-16 groundwater sampling tool.
- Dissolved oxygen (DO), pH, temperature, and specific conductance will be monitored during purging to look for steady-state conditions. Collection of groundwater samples via low-flow methods will take place once pH and specific conductance readings have stabilized. pH will be considered stable when three consecutive readings vary by no more than 0.1 standard units.
- Once stabilization has been established, appropriate sample containers can be filled directly from the low-flow discharge.
- If the well recharge is limited, monitoring of stabilization parameters will be stopped and a water sample will be collected.

### **Sample Identification**

Each sample collected from the site will be assigned a unique alpha-numeric sample descriptor. The sample ID will be recorded in the field notes. Samples will be designated as “SP” for screen point samples.

## **Sample Shipment and Laboratory Analysis**

Groundwater samples for laboratory analysis will be placed in appropriate sample containers provided by the laboratory and labeled with sample identification information. Sample containers will be placed on ice immediately after collection for transport to a Wisconsin Certified Laboratory for analysis. The samples will be laboratory analyzed for VOCs using EPA Method 8260 on a standard turn-around time (10 business days).

## **Temporary Well Locations**

The final sampling locations will be logged using differential global positioning system (GPS) techniques. A Trimble Geoexplorer handheld GPS unit, with H-Star technology enabled (or equivalent), will be used to collect these locations. Where field conditions permit, carrier-phase signal data will be used for GPS data collection. When collecting GPS location data, field staff will continuously log a sample position until the predicted post-processed accuracy is better than 1 foot, or until 30 position readings have been collected. All data collected with the Trimble GPS unit will be post-processed through the software program Trimble Pathfinder Office using nearby reference station Global Navigation Satellite System (GNSS) reference data, as available. GPS and survey data will be projected into the State Plane coordinate system (NAD83, US Feet).

## **Temporary Well Abandonment**

Following groundwater sample collection, temporary wells will be abandoned by removing the SP-16 groundwater sampling tool and plugging the un-collapsed portion of the borehole using bentonite chips, bentonite granules, or a high-solids bentonite grout to within 6 inches of the ground surface. The remaining borehole will be topped with soil and compacted, or if located in a paved area, the surface will be patched with concrete or asphalt as appropriate.

## **Decontamination of Equipment**

Single-use sampling equipment and materials will be used wherever possible. Single-use equipment may include, but is not limited to, nitrile gloves, plastic core barrel liners, plastic bags, and LDPE and silicone tubing. Non-single-use sampling equipment, such as direct-push cutting shoes and core barrels, will be decontaminated between uses by washing with a non-phosphate detergent solution and rinsing with potable water.

## **Investigation-Derived Waste**

Investigation-derived waste streams generated during this investigation will include, well purge water, decontamination fluids, and general refuse (e.g., used personal protective equipment, single-use sampling equipment, and trash). Excess soil cuttings will not be generated by the proposed sampling methods. Well purge water and decontamination fluids will be disposed for treatment at the permitted Village of Grafton wastewater treatment plant. General refuse will be collected in trash bags and placed in a waste dumpster.

Mr. John Feeney  
Wisconsin Department of Natural Resources  
June 30, 2020  
Page 7

### Schedule

We anticipate that the site investigation activities will begin within approximately four to six weeks following WDNR's approval of this Site Investigation Workplan. The specific schedule for the field work is subject to change and will depend upon coordination with Village regarding operations within the rights-of-way.

### Reporting

TRC will tabulate and evaluate the results of these site investigation activities to determine if additional investigation or remedial action are needed to comply with closure criteria of Wis. Admin. Code ch. 726. TRC will provide the WDNR with a letter report documenting the findings of this investigation and recommendation for next steps (which could be a remedial action plan).

### NR 712 Certification

I, Bryan Bergmann, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03(1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

  
\_\_\_\_\_  
Signature

June 30, 2020  
\_\_\_\_\_  
Date

Enclosed is a check for \$700 for the site investigation workplan review fee and request for approval to use temporary wells.

Please contact me at (262) 328-4528 with any questions. I look forward to your review and response to this request.

Sincerely,

TRC



Marita Stollenwerk  
Senior Project Manager



Bryan Bergmann, PG  
Quality Reviewer

Attachments: Figure 1 – Proposed Sampling Locations

cc: Amber Thomas – Village of Grafton (pdf via email)

**Figure**

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