708 Heartland Trl.
Suite 3000
Madison, WI 53717

T 608.826.3600
TRCcompanies.com

February 17, 2021

Ms. Demaree Collier
U.S. Environmental Protection Agency
Region 5 (HSRM-6)
77 West Jackson Blvd.
Chicago, IL 60604

Subject: Environmental Monitoring Plan – Revision 5
Lemberger Landfill Sites
Town of Franklin, Wisconsin

Dear Ms. Collier:

On behalf of the Lemberger Sites Remediation Group (LSRG), TRC is submitting Revision 5 of the Environmental Monitoring Plan (EMP) for the Lemberger sites located in the Town of Franklin, Wisconsin. With the recent Record of Decision (ROD) Amendment for the sites to include Monitored Natural Attenuation (MNA), the EMP is being modified to support the change in remedy for the sites.

Please review and comment on the attached EMP. Please contact me (608-826-3637) or Tom Sullivan (608-469-1928) if you have questions.

Sincerely,

TRC

Kristopher D. Krause, P.E.
Senior Project Manager

Attachment

cc: BJ LeRoy – WDNR
Brian Potts – Perkins Coie, LLP
Kristin Jones – Newell Rubbermaid
Troy Adams – Manitowoc Public Utilities
Scott Karbon – Manitowoc Public Utilities
James Wallner – Red Arrow Products
James Cook – Manitowoc Cranes
Kathleen McDaniel – City of Manitowoc
David Dougherty – Subterranean Research, Inc.
John Lang – EHS Support, LLC
Tom Sullivan – EHS Support, LLC

Environmental Monitoring Plan

Lemberger Landfill and Lemberger Transport and Recycling Site
Town of Franklin, Wisconsin

February 2021
Revision 5

Prepared For:

Lemberger Sites Remediation Group

Prepared By:

TRC
708 Heartland Trail, Suite 3000
Madison, Wisconsin 53717

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List of Acronyms and Abbreviations

"D"	deep (well)
"I"	intermediate (well)
"S"	shallow (well)
CVOCs	chlorinated volatile organic compounds
DO	dissolved oxygen
EDD	electronic data deliverable
EMP	Environmental Monitoring Plan
IC	Institutional Control
LEL	Lower Explosive Limit
LGU	Lower Granular Unit
LL	Lemberger Landfill
LSRG	Lemberger Sites Remediation Group
LTR	Lemberger Transport and Recycling
MNA	monitored natural attenuation
OMP	Operation and Maintenance Plan
PAL	Preventive Action Limit
QAPP	Quality Assurance Project Plan
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOW	Scope of Work
SWCDA	Special Well Casing Depth Area
TAD	Turnaround Document
TAL	Target Analyte List
TOC	total organic carbon
UGU	Upper Granular Unit
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WDNR	Wisconsin Department of Natural Resources
WPDES	Wisconsin Pollutant Discharge Elimination System

1.0 Introduction

This Environmental Monitoring Plan (EMP) has been prepared for future groundwater, leachate, and landfill gas monitoring at and around the Lemberger Landfill (LL) and Lemberger Transport and Recycling (LTR) sites (collectively known as the "Lemberger sites" or "site") located in Franklin Township, Manitowoc County, Wisconsin. This document has been prepared in support of a federal Record of Decision (ROD) amendment incorporating and selecting a monitored natural attenuation (MNA) remedy for chlorinated volatile organic compounds (CVOCs) in groundwater. It is intended to present a long-term MNA groundwater monitoring and reporting program, as well as cover all other ongoing monitoring efforts at the Lemberger sites. Details of sampling procedures identified in this EMP are provided in the Sampling and Analysis Plan (SAP) (TRC 2013b). Details of data quality objectives, analytical methods, quality assurance, etc. are found in the Quality Assurance Project Plan (QAPP) (TRC 2012). The SAP and QAPP should be considered companion documents to this EMP.

1.1 Background

Environmental monitoring has been conducted quarterly in accordance with the Operation and Maintenance Plan ("O&M Plan"; Malcolm Pirnie, 1997) at the Lemberger sites since remedial actions were implemented in 1997. Since that time, the monitoring program has been periodically modified based on data observations and field conditions. Each modification was presented to and approved by USEPA before changes were implemented.

The Consent Decree Scope of Work (SOW) specifies that the groundwater monitoring program must meet the following objectives:

- Remediation monitoring to evaluate the effectiveness of the remedial actions in reducing constituent of concern (COC) concentrations in the groundwater to cleanup standards;
- Perimeter monitoring to provide early warning of any possible future groundwater plume advancement;
- Selected private well monitoring to protect human health.

Groundwater monitoring is by far the largest component of the environmental monitoring program at the Lemberger sites. The Record of Decision (ROD) (USEPA 1991) for the Lemberger sites required remedial actions that included sampling of residential wells for human health protectiveness and geochemical and water level monitoring through a network of monitoring wells to verify the effectiveness of the groundwater extraction system.

Initially, a network of 110 wells was established to meet those objectives. Over time, the groundwater monitoring network has grown to over 120 points where groundwater samples have been analyzed for volatile organic compounds (VOCs). Since the previous revision of the EMP (Revision 4, TRC, 2014), one new monitoring well (RM-404XXD) has been installed by Lemberger Site Remediation Group ("LSRG"), and this well has been sampled quarterly since its installation in February 2017. The new monitoring well is included in this EMP. Figure 1 illustrates the location of the various wells at the Lemberger sites.

Groundwater monitoring was initiated at the Lemberger sites in a phased approach with more intensive sampling for the first three years. The program was modified in 1998 to split the

monitoring wells into two groups (Plume Group I/II) to focus the quarterly monitoring on wells within the plume with less frequent monitoring elsewhere. The program was later modified to subdivide the monitored locations into 10 groupings sampled at different intervals. That program continued with occasional modifications until a series of monitored natural attenuation (MNA) demonstration studies were initiated in 2006. The sampling programs associated with the 2006 MNA demonstration study (RMT, 2008), a second MNA demonstration study in 2013 (TRC, 2013a), interim sampling programs, and the "Program After MNA Study" are summarized in the previous revision to this EMP (Revision 4; TRC, 2014). The "After MNA Study" sampling program continued following the 2013 MNA demonstration study until March 2016, when a modified MNA monitoring program was approved by the USEPA (USEPA, 2016). The March 2016 monitoring program has continued to the present.

In 2019, TRC presented a comprehensive report containing all of the MNA data and interpretations spanning over 12 years of MNA demonstration studies and over 20 years of site groundwater data (TRC, 2019). The weight of evidence derived from these MNA studies indicates that the CVOC plume is stable or reducing and naturally degrading, and that natural attenuation of the CVOCs in groundwater is occurring at a rate sufficient to contain and further degrade the CVOC plume in a reasonable timeframe. The MNA demonstration report recommended in conclusion that an MNA remedy should be identified as an appropriate remedy in a future ROD Amendment. In January 2021 USEPA approved the selection of an MNA remedy in a ROD Amendment for the Lemberger sites.

1.2 Purpose and Scope

This EMP revision is intended to present an updated long-term MNA monitoring program for the site that covers groundwater monitoring, residential well monitoring, and the sampling of all other media. This EMP calls out proposed revisions to the currently approved monitoring plan and presents an approach for future modifications to the monitoring plan.

2.0 Environmental Monitoring Plan

The March 2016 revision to the monitoring program which is currently in effect (USEPA, 2016) recognizes a significant reduction in the number of wells monitored and the monitoring frequency when compared to the "After MNA Study" plan detailed in the previous EMP revision (Revision 4; TRC, 2014). The March 2016 monitoring plan was developed in consideration of appropriate MNA guidance documents (e.g., Pope et al., 2004 and WDNR, 2014) and through negotiations with the USEPA. This monitoring plan, with minor revision, will be implemented as the long-term monitoring program for the site. Figure 2 through Figure 6 illustrate the wells to be sampled during each monitoring event. The following sections provide details of the long-term program, including proposed changes and considerations for future modifications of the EMP.

2.1 Long Term Groundwater Monitoring Program

2.1.1 Groundwater, Surface Water, and Landfill Leachate Level Monitoring

Groundwater and landfill leachate levels had been collected monthly at over 100 locations between 1998 and 2013, and at least semi-annually through 2015. Water table elevation maps for the perched Upper Granular Unit (UGU) aquifer and potentiometric surface maps of the groundwater in the bedrock and Lower Granular Unit (LGU) aquifer have been reported annually to the agencies since 1998. Those efforts have resulted in a comprehensive set of hydrologic data. The groundwater flow direction in the UGU and LGU/bedrock aquifers has remained consistent throughout over 20+ years of monitoring. Synoptic water level measurement events were removed from the monitoring program in the March 2016 monitoring plan revision (Table 1). Water level measurements are collected from each monitoring well at the time of sampling over the course of each sampling event. Additionally, water levels will be measured at monitoring wells RM-004D, RM-010D, and RM-305D in the September monitoring events; and at monitoring wells RM-004D, RM-010D, RM-301S, RM-302S, and RM 305D in the June monitoring events to aid in the development of water table and potentiometric surface maps.

2.1.2 Sentinel Monitoring Wells

Six sentinel monitoring wells (RM-002D, RM-003D, RM-003XXD, RM-210D, RM-401XXD, and RM-403XD) will be sampled for volatile organic compounds (VOCs) on a quarterly basis for institutional control. Data from these wells are intended to provide adequate early warning to residential well owners of changing plume conditions.

2.1.3 Plume Monitoring Wells

Plume monitoring wells were sorted into three groupings with different monitoring frequencies and objectives based on location within the plume, the current chlorinated volatile organic compound (CVOC) concentrations, and CVOC trends. The first group of 10 wells are monitored for VOCs on a semi-annual basis ("Group 1" in Table 1). These wells are located along the plume centerline and are considered key monitoring wells to demonstrate the protectiveness of the MNA remedy and monitor progress toward the attainment of groundwater quality standards. This group includes wells within the DMZ (e.g., RM-007XD and RM-401XD), wells outside the DMZ (e.g., RM-008D and RM-402XD), and locations downgradient of the LL (e.g., RM-005D and RM-204D).

The second group of plume monitoring wells ("Group 2", Table 1) includes 15 monitoring wells that will be monitored for VOCs on an annual basis. These wells are located upgradient of the

plume (e.g. RM-102D); along the plume perimeter (e.g., RM-007XXD, RM-101D, RM-202D, and RM-304D), and at additional locations within the plume extents to demonstrate the overall stability of the plume over time (e.g., RM-213D, RM-213XD, and RM-214).

A third group of seven plume wells and one residential well (GR-72) ("5-Year Review Wells", Table 1) will be sampled every 5-years for VOCs in conjunction with the USEPA 5-year site review schedule. These wells are included to evaluate and document the overall plume dimensions for the 5-year review. These wells were last sampled in June 2019 to be included in the fourth 5-year review in 2020.

2.1.4 LL Wells

Monitoring of the LL area will continue with the monitoring of four leachate wells (in lieu of leachate extraction and sampling) and four shallow groundwater monitoring wells around the perimeter of the LL for VOCs. These data will provide an ongoing assessment of leachate chemistry and be used to evaluate the effectiveness of the slurry wall. Sampling at the LL will be performed during the June sampling event, which historically correlates with the annual high water table conditions.

2.1.5 MNA Parameters

A subset of 12 wells that are sampled as a part of the sentinel or plume monitoring programs described above will be sampled for MNA parameters alkalinity, chloride, nitrate (as nitrate + nitrite), sulfate, total organic carbon (TOC), iron, and manganese in addition to VOCs (Table 1). This subset of wells includes a background location (RM-102D), and wells located along the plume centerline.

2.2 Changes to Existing Groundwater Monitoring Program

The monitoring program shown in Table 1 incorporates two proposed changes from the approved March 2016 monitoring program - one change is to the residential well monitoring, and one is to the plume monitoring program. The proposed changes are highlighted in Table 1. Changes to the residential well sampling program are discussed in the next section. Monitoring well RM-404XXD was installed in February 2017 and has been sampled quarterly from March 2017 through December 2020 in accordance with the approved program. The approved program called for an evaluation of the monitoring frequency at this well following the collection of a minimum of 2 years of data.

Four years of VOC data are now available from well RM-404XXD. Concentrations of all CVOCs at this well have stabilized at or near parameter detection limits. This well is located approximately 1,000 feet west of sentinel well RM-401XXD, which monitors the northern-most limit of ES exceedances at a similar elevation along the centerline of the plume. Well RM-404XXD is also located approximately 800 feet north of sentinel wells RM-003D and RM-003XXD. While TCE concentrations at RM-003D continue to occasionally exceed the ES, concentrations of CVOCs at RM-003D continue to exhibit stable to decreasing trends. Concentrations of all CVOCs at RM-003XXD have decreased to near the detection limits.

Based on the available data and the locations of nearby sentinel wells, TRC recommends that RM-404XXD is sampled for VOCs and MNA parameters on an annual basis. The analytical frequency at this location will be re-evaluated if:

- Concentrations of CVOCs at this well show an increasing trend or exceed a groundwater quality standard in two consecutive monitoring events.
- Monitoring results at other site monitoring wells suggest that the centerline of the plume has shifted.

2.3 Residential Well Sampling Program

The residential well sampling program will include the same residential wells specified in the approved March 2016 monitoring program, however the sampling frequency will be reduced to annual for all wells in the program. The residential well program is summarized in Table 1, and on Figure 6, and is described below.

- Residential wells (GR-8, -9, -10, -11, -12, -13, -26, -62, -63, -64, -66, and -74) located within the areal extent (but deeper than) the CVOC plume (as defined by the Enforcement Standard [ES]) were in the semiannual sampling program but will now be sampled annually for VOCs. GR-13 has historically had detections of VOCs. GR-13 is a shallow well and is not used for drinking water. GR-73 is located within the plume, but is owned by the LSRG, and is infrequently used as a water source for site drilling activities or cleaning. It will be sampled annually to aid in defining the vertical extent of the plume. The demonstrated stability of the CVOC plume and the establishment of a sentinel monitoring well network ensures that annual monitoring of these residential wells maintains protectiveness.
- There are several wells located with the areal extent of the CVOC plume that have historically been sampled, but cannot currently be sampled:
  - GR-15 is a vacant residence without electrical service.
  - GR-17 is within the plume area but no longer is supplied with electrical service and is not used.
  - GR-25 is not sampled because the current owner refuses access.

  These wells may be evaluated on a case by case basis for return to the monitoring program if the LSRG identifies them as operational/accessible in the future.
- Residential wells GR-14, -16, -30, -60R, -65, and -73 are located at the plume fringe or outside the plume (Figure 6). These wells will continue to be sampled annually for VOCs to aid in defining the vertical extent of the plume.
- Residential well GR-72, located approximately 2,800 feet west of the LTR, was sampled in the second quarter (Q2) of 2019 and will be sampled every 5 years thereafter for VOCs in conjunction with the USEPA 5-year site review schedule.
- Residential wells GR-31, -33, and -41 are located upgradient and outside of the annually sampled wells. These wells have been removed from the monitoring program unless nearby residential wells have confirmed detections of CVOCs, in which case, these wells will be evaluated to be returned to the monitoring program. GR-24, which was previously sampled annually, has been abandoned.

If site-related constituents are detected in sentinel or residential wells, the sampling schedule will be evaluated to ensure protectiveness. Consideration will be given to the location and depth of the detection as to which wells should be sampled and at what frequency. Such decisions must be made on a case-by-case basis owing to the uncertainty associated with the location of the exceedance. In the event of a confirmed sentinel/residential well detection, the proposed strategy to address the future monitoring will be sent to USEPA after receipt and evaluation of the validated data of the detection.

2.4 Approach for Addition of New Residential Wells

The Third Five-Year Review Report (USEPA, 2010) specified that the O&M Plan has no provision for including new residential wells located within the Special Well Casing Depth Area (SWCDA) associated with the Lemberger sites into the groundwater monitoring program. This omission was addressed in Revision 4 of the EMP (TRC, 2014) as described here. The recently updated Institutional Control (IC) Plan (Foley & Lardner, 2009) includes a commitment to conduct a visual survey (aided by recent aerial photographs), coupled with personal queries conducted during residential well sampling, to identify if any new residential wells are installed within the shaded areas outlined on Figure 6. If a new well is discovered, and sampling of that well is deemed necessary, the owner will be notified by the LSRG and issued an access agreement for the well to be included into the EMP sampling program. No new residential wells have been identified in the area since the March 2016 revision of the monitoring program.

With adoption of this EMP, any new residential well that is identified within the yellow shaded area on Figure 6 will be considered for inclusion in the list of residential wells that are sampled annually.

2.5 Other Environmental Sampling

Groundwater is not the only media sampled as part of the EMP at the Lemberger sites. These sample events are summarized at the end of Table 1.

- Landfill gas is monitored annually from gas ports (GP-1 through GP-6) and gas vents (GV-1 through GV-36) located at the LTR (Figure 7). Gas concentrations of methane (as a percentage of total gas and as a percentage of the lower explosive limit [LEL]) are measured in addition to percent oxygen. Barometric pressure is also monitored at the time of sample collection. The above parameters are measured in the field using a landfill gas monitor (e.g., Landtec 500).

- Operation of the groundwater and leachate extraction systems was discontinued to evaluate monitored natural attenuation (MNA). The extraction systems were maintained in a general state of readiness until November 1, 2017, when USEPA approved “mothballing” the treatment system owing to its age and the unlikelihood that the system would be operated in the future (USEPA, 2017). Although no effluent is being discharged, reporting as required under the Wisconsin Pollutant Discharge Elimination System (WPDES) permit for the treatment system will continue as specified in the QAPP (TRC, 2012) until the WPDES permit has been closed.

2.6 Wells Not Sampled and Wells for Future Abandonment Consideration

Table 1 also lists wells that will not be sampled during the routine sampling prescribed in this EMP. These wells typically are outside the limits of impacted groundwater or are no longer deemed necessary to define the limits of the CVOC plume. However, if conditions are found to change during the monitoring period, these wells may be sampled. Table 2 lists monitoring wells that are proposed for abandonment in the future. Wisconsin Administrative Code NR 141.25(1)(b) states that any well no longer being used must be abandoned within 60 days "after its use has been discontinued." Since the wells listed in Table 2 may still be used if plume conditions are found to change or as requested in the five-year review, the code requirement does not apply at this time.

3.0 Reporting and Schedule

Groundwater data reporting is proposed to be consistent with the current program. Currently, data transmittals are prepared quarterly and sent to USEPA and WDNR. The data transmittal includes an electronic data deliverable (EDD) to the WDNR and USEPA. The EDD will include all data from the reporting period, even if not directly part of the groundwater monitoring (e.g. gas sampling, effluent results, any additional samples collected). The data transmittals will be issued 75 days following receipt of the final data package(s). Hard copies of the analytical reports will be compiled and sent to USEPA and the WDNR as well. A data summary will be reported with the annual O&M Progress Report (described below).

The annual O&M Progress Report will be the primary document submittal produced that summarizes the sampling efforts performed under this EMP. The annual O&M progress report will be issued in December of each year and provided in hard copy and searchable electronic formats. The following items will be included in the annual O&M Progress Report:

- Summary of residential well sampling and analysis including reporting, changes to well network, corrective actions, and follow-up on any detections of site-related constituents,
- Complete set of laboratory analytical reports with duplicates identified as to their origin,
- Leachate monitoring data (level monitoring with updated comparison charts to waste elevations and any analytical data collected),
- Gas monitoring data,
- Groundwater monitoring (hydrologic and analytical) data with any new or replacement wells identified,
- Trend plots of CVOC concentrations at monitoring wells,
- Site inspection reports to include landfill cover, fencing, wells, treatment system, leachate collection, groundwater extraction, leachate storage, etc.,
- A brief discussion of progress made towards achieving groundwater cleanup goals,
- Report on IC activity,
- An existing conditions map showing monitoring wells, monitored residential wells (including any recently installed residential wells within the plume area), leachate head wells, gas wells, and extraction wells,
- Updated water table and potentiometric surface maps for that year,
- A tabulation of historical data versus date including detects and non-detects, continuing the tabulation provided in the MNA summary reports,
- Updated isoconcentration maps showing the distribution of TCE, 1,1,1-TCA, cis-1,2-dichloroethene, 1,1-dichloroethene, and vinyl chloride in groundwater,
- New or updated geologic cross-sections that include any recently installed monitoring wells and the most complete round of analytical data collected during the reporting period that apply to wells on that cross section,

- A summary of any physical data collected at the landfills,
- A listing of any deliverables submitted during the reporting period,
- A summary of deviations from this EMP, the SAP, or QAPP that occurred.
- Pertinent contacts with the local community,
- Any areas of concern identified as they pertain to remedial effectiveness or delays (includes discussion of concentration trends in sentinel wells),
- Discussion of any monitoring results that lead to evaluation or implementation of changes to or based on the EMP,
- Progress made in addressing concerns or action items identified from inspections or monitoring, and
- Key personnel changes made during the reporting period.

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Table 1: Proposed Long Term MNA Monitoring Program
Lemberger Sites

Well Grouping/ Designations	Sampling Frequency	Laboratory Analytical Parameters	Field Analytical Parameters	Rationale / Notes
LTR Sentinel Wells RM-002D, RM-003D, RM-003XXD, RM-210D, RM-401XXD, RM-403XD	Quarterly (March, June, September, December)	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• Sentinel wells sampled quarterly for institutional control • RM-003D and RM-003XXD chosen as representative of the aquifer's NW margin and are critical to MNA analysis • RM-404XXD was sampled on a quarterly schedule for four years. Proposed move to annual schedule (see below)
CVOC Plume Wells (Group 1) RM-005D, RM-007XD, RM-008D, RM-204D, RM-208D, RM-211D, RM-307D, RM-401XD, RM-402XD, RM-402XXD	Semiannually (March, September)	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• Includes plume wells within the DMZ with increasing trends • Includes wells in the plume centerline with stable of decreasing trends that are critical to the MNA determination
CVOC Plume Wells (Group 2) OW-104F, RM-007D, RM-007XXD, RM-101D, RM-102D, RM-202D, RM-203D, RM-208XD, RM-212D, RM-213D, RM-213XD, RM-214D, RM-303D, RM-306D **RM-404XXD (proposed change)**	Annually (September)	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• These monitoring wells are used to document plume stability. • **RM-404XXD has been sampled quarterly since installation in 2017 and concentrations of all CVOC constituents have stabilized near or below the detection limits. This well has been retained in the annual plume monitoring program to document plume stability.**
LL Wells RM-005S, RM-206S, RM-207S, RM-208S, LH-01, LH-03, LH-06, LW-07	Annually (June)	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• Includes four leachate wells to provide data from each area in the landfill in lieu of continued leachate extraction. • June sampling typically has the highest water levels

Table 1: Proposed Long Term MNA Monitoring Program
Lemberger Sites

Well Grouping/ Designations	Sampling Frequency	Laboratory Analytical Parameters	Field Analytical Parameters	Rationale / Notes
5-year Review Wells RM-004D, RM-103D, RM-301S, RM-302S, RM-304D, RM-305D, RM-308D, GR-72	Once every 5-yrs (June)	TAL VOCS	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• These wells are needed to document plume dimensions for 5-yr review. • First sampling round was June 2019 to be included in the 5-year review for 2020. • GR-72 as per prior agreement with USEPA.
MNA Parameters OW-104F, RM-002D, RM-003XXD, RM-007D, RM-007XD, RM-102D, RM-203D, RM-204D, RM-210D, RM-401XXD, RM-402XD, RM-404XXD	Once per year (September)	Alkalinity, chloride, iron, nitrate+nitrite, manganese, sulfate, and TOC	pH, temperature, specific conductance, turbidity, DO, ORP, depth to water	• MNA parameters will collected annually during the September sampling round as these wells are already being sampled in that round. • These wells are located along the centerline of the plume and are critical to the MNA determination
Water Levels Only RM-004D, RM-010D, RM-301S, RM-302S, RM-305D	Once or twice per year (see notes)	None	Depth to water	• RM-301S and RM-302S measured in June with the LL sampling. • RM-004D, RM-010D, and RM-305D measured in June and September.
Residential Wells GR-8, GR-9, GR-10, GR-11, GR-12, GR-13, GR-26, GR-62, GR-63, GR-64, GR-66, GR-74	**Annually (September)** **(Proposed change)**	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP	• These private wells generally correspond to those that fall within the portion of the NR 812.09 “special casing requirement” area west of Hempton Lake Road and north of median line of Section 34. • GR-15 and GR-17 are no longer in service and cannot be sampled. Will be sampled if the well(s) are returned to service. • GR-25 cannot be sampled because owner refuses access. Will sample if permission is granted.

Table 1: Proposed Long Term MNA Monitoring Program
Lemberger Sites

Well Grouping/ Designations	Sampling Frequency	Laboratory Analytical Parameters	Field Analytical Parameters	Rationale / Notes
Residential Wells GR-14, GR-16, GR-30, GR-60R, GR-65, GR-73	Annually (September)	TAL VOCs	pH, temperature, specific conductance, turbidity, DO, ORP	
Extraction System Effluent Extraction system sample port	None	None	None	• Operation of the groundwater extraction system was discontinued as a part of the MNA demonstrations; USEPA approved "mothballing" the system in 2017. • Discharge Monitoring Reports are filed with the WDNR monthly to maintain the WPDES permit
Landfill Gas GP-1, GP-2, GP-3, GP-4, GP-5, GP-6, and GV-1 through GV-36	Annually (November)	None	Barometric pressure, methane, percent methane LEL, percent oxygen	• Measured with a gas meter (i.e. Landtec)
Wells Conditionally Monitored/Sampled EW-02D, GR-15, GR-17, GR-31, GR-33, GR-41, GR-67, GR-68, GR-69, GR-70, GR-71, OW-101B, RM-001D, RM-003I, RM-005I, RM-007S, RM-101I, RM-203I, RM-204I, RM-208I, RM-210I, RM-212I	None	None	None	• Select wells may be sampled at the request of USEPA in conjunction with a 5-year review period • Intermediate wells will be sampled on an as-needed basis if warranted after evaluation of each round of data. If concentrations of CVOC are outside of historic ranges, the need for additional sampling will be evaluated and a recommendation presented to the agencies.

Notes:
DO = Dissolved Oxygen.
LEL = Lower Explosive Limit
ORP = Oxidation-Reduction Potential
SVOC = Semi-volatile Organic Compounds
TCL = Target Compound List
TOC = Total Organic Carbon
VOCs = Volatile Organic Compounds

Table 2: Wells Recommended for Abandonment
Lemberger Sites Environmental Monitoring Plan

Wells	Rationale / Notes
EW-03D, EW-05I, EW-06D, EW-06S, EW-08D, EW-09D, GWC-1, GWC-2, GWC-3, OW-102B, OW-102C, OW-102D, OW-103A, OW-103B, OW-104A, OW-104C, OW-104D, OW-104E, OW-104G, OW-104H, OW-105A, OW-105B, OW-106A, OW-106B, RM-001I, RM-002I, RM-004S, RM-011D, RM-103S, RM-103I, RM-201I, RM-202I, RM-205I, RM-205D	These wells have been determined to be no longer needed to adequately monitor the plume and are identified as wells that will be considered for abandonment at some later date.

LEGEND

SAMPLE AND MONITORING LOCATIONS

- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)
- STAFF GAUGE (SG)

LANDFILL AREA

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.

N

0 1,000 FEET

1 " = 1,000 '

1:12,000

PROJECT:

LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:

EMP SITE PLAN SHOWING EXISTING SITE FEATURES

DRAWN BY:	S. MAJOR	SCALE: AS NOTED	PROJ. NO. 376165.0000
CHECKED BY:	L. AUNER		FILE NO. 376175-001EMPsp.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:	**FIGURE 1**
DATE:	JANUARY 2021		

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S:\1-PROJECTS\LembergerLandfill\376175_LL\EMP_Dec2020\376175-001EMPsp.mxd

LEGEND

- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)
- STAFF GAUGE (SG)
- LANDFILL AREA

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. SAMPLED WELLS ARE LABELED WITH THE WELL IDENTIFICATION. ALL OTHER SAMPLING POINTS ARE NOT LABELED.

N

0 1,000 FEET

1 " = 1,000 '

1:12,000

PROJECT:

LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:

EMP QUARTERLY GROUNDWATER QUALITY MONITORING LOCATIONS (SENTINEL WELLS)

DRAWN BY:	S. MAJOR	SCALE: AS NOTED	PROJ. NO. 376175.0000
CHECKED BY:	L. AUNER		FILE NO. 376175-002EMPq.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:	**FIGURE 2**
DATE:	JANUARY 2021		

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LEGEND

- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)
- STAFF GAUGE (SG)
- LANDFILL AREA

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. SAMPLED WELLS ARE LABELED WITH THE WELL IDENTIFICATION. ALL OTHER SAMPLING POINTS ARE NOT LABELED.

N

0 1,000 FEET

1 " = 1,000 '

1:12,000

PROJECT:
LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:
EMP SEMI-ANNUAL GROUNDWATER QUALITY MONITORING LOCATIONS (MARCH, SEPTEMBER)

DRAWN BY:	S. MAJOR	SCALE:		PROJ. NO.	376175.0000
CHECKED BY:	L. AUNER		AS NOTED	FILE NO.	376175-003EMPsa.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:		**FIGURE 3**	
DATE:	JANUARY 2021				

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LEGEND

- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)
- STAFF GAUGE (SG)
- LANDFILL AREA

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. SAMPLED WELLS ARE LABELED WITH THE WELL IDENTIFICATION. ALL OTHER SAMPLING POINTS ARE NOT LABELED.
4. ANNUAL GROUNDWATER QUALITY MONITORING OCCURS IN SEPTEMBER, UNLESS OTHERWISE INDICATED.

0 1,000 FEET

N

1 " = 1,000 '

1:12,000

PROJECT:

LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:

EMP ANNUAL GROUNDWATER QUALITY MONITORING LOCATIONS (JUNE AND SEPTEMBER)

DRAWN BY: S. MAJOR	SCALE: AS NOTED	PROJ. NO.	376175.0000
CHECKED BY: L. AUNER		FILE NO.	376175-004EMPa.mxd
APPROVED BY: M. WESTOVER	DATE PRINTED:	**FIGURE 4**	
DATE: JANUARY 2021			

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LEGEND

- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)
- STAFF GAUGE (SG)
- LANDFILL AREA

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. SAMPLED WELLS ARE LABELED WITH THE WELL IDENTIFICATION. ALL OTHER SAMPLING POINTS ARE NOT LABELED.

N

0 1,000 FEET

1 " = 1,000 '

1:12,000

PROJECT:
LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:
EMP 5-YEAR REVIEW GROUNDWATER QUALITY MONITORING LOCATIONS

DRAWN BY:	S. MAJOR	SCALE: AS NOTED	PROJ. NO. 376175.0000
CHECKED BY:	L. AUNER		FILE NO. 376175-007EMPgpgv.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:	**FIGURE 5**
DATE:	JANUARY 2021		

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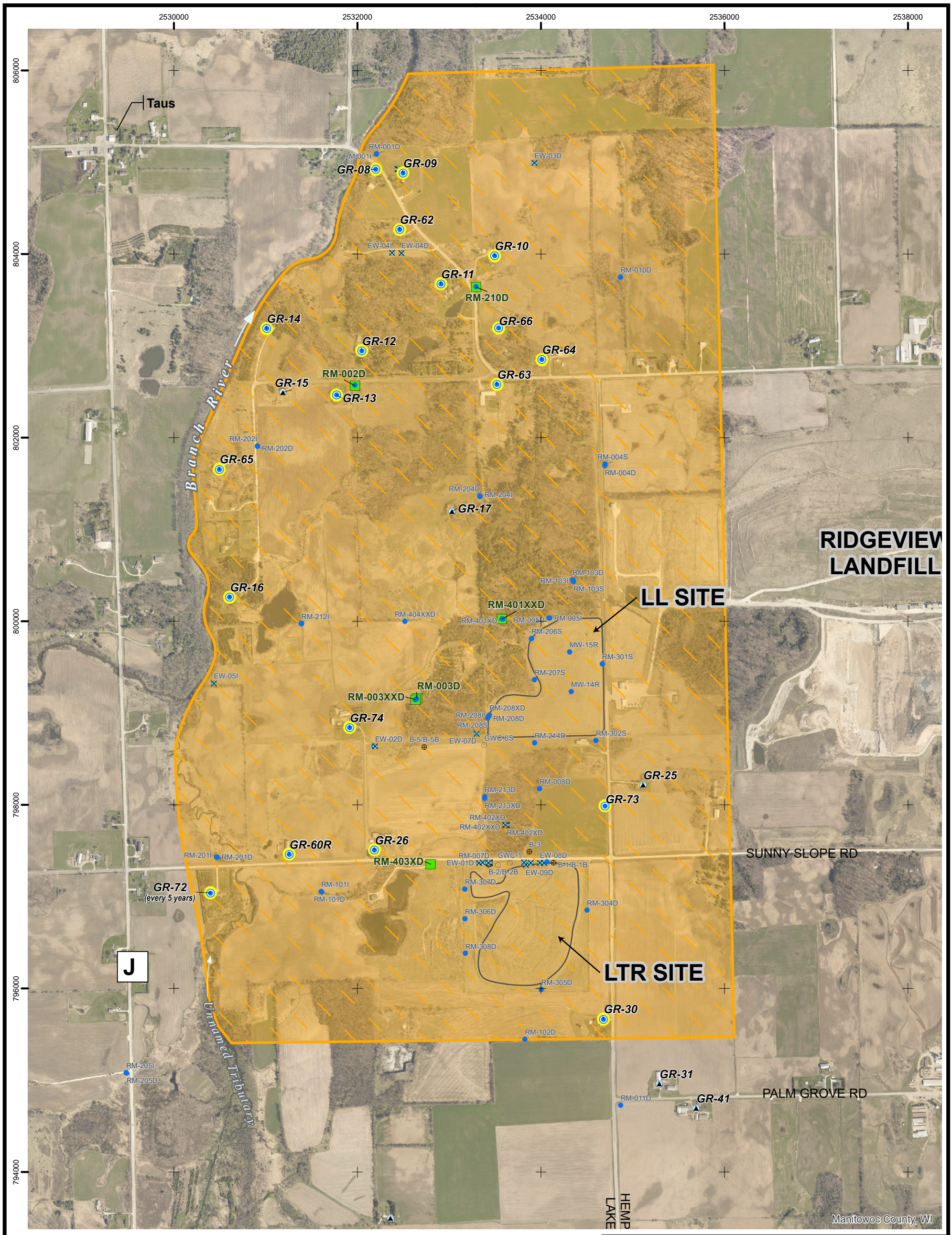

LEGEND

SAMPLE AND MONITORING LOCATIONS

- BEDROCK BORING
- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- MONITORING WELL (RM)
- **RESIDENTIAL WELL (GR)**
- **RESIDENTIAL WELL IN MONITORING PROGRAM**
- SENTINEL WELLS

LANDFILL AREA

PRIVATE WELL AREAS

RESIDENTIAL WELL SAMPLING AREA (CASE-BY-CASE CONSIDERATION)

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES REFERENCE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. GR-73 IS NOT USED FOR DOMESTIC SUPPLY.

N

0 1,000 FEET

1 " = 1,000 '

1:12,000

PROJECT:

LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:

EMP RESIDENTIAL WELL SAMPLING PROGRAM

DRAWN BY:	S. MAJOR	SCALE: AS NOTED	PROJ. NO. 376175.0000
CHECKED BY:	L. AUNER		FILE NO. 376175-005EMPrwsp.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:	**FIGURE 6**
DATE:	JANUARY 2021		

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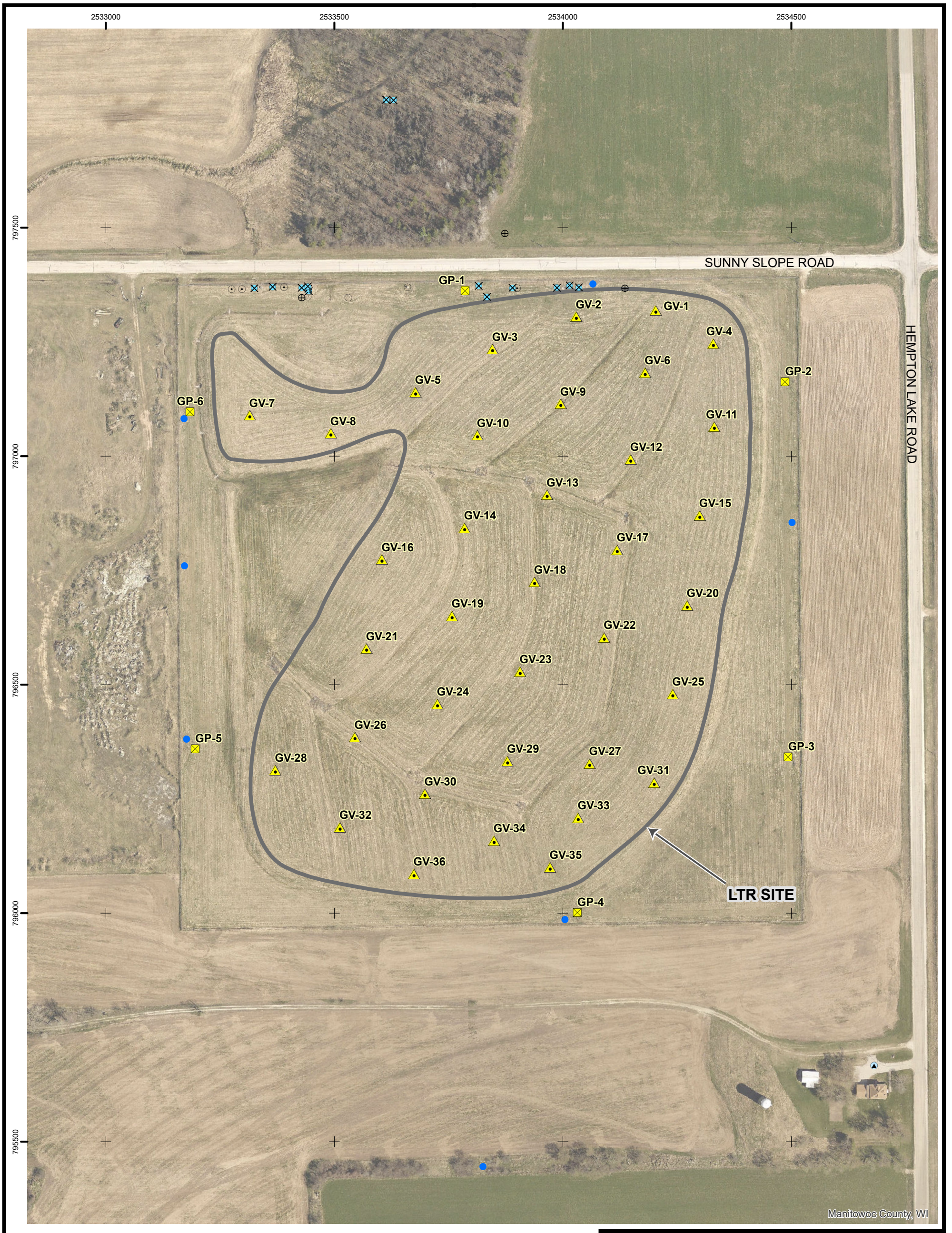

LEGEND

SAMPLE AND MONITORING LOCATIONS

- GAS PROBE
- GAS VENT
- BEDROCK BORING
- GW COLLECTION SUMP (GWC)
- GW EXTRACTION WELL (EW)
- GW OBSERVATION WELL (OW)
- LEACHATE HEAD WELL (LH)
- LEACHATE WITHDRAWL WELL (LW)
- MONITORING WELL (RM)
- RESIDENTIAL WELL (GR)

APPROXIMATE LIMITS OF WASTE

NOTES

1. AERIAL IMAGERY FROM MANITOWOC COUNTY, 2017.
2. MAP COORDINATES ARE WISCONSIN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT.
3. GAS PROBE AND VENT LOCATIONS DIGITIZED FROM 1996 MILLER/TERRA CAD DRAWING.

N

0 200 FEET

1 " = 200 '

1:2,400

PROJECT:

LEMBERGER SITES
TOWN OF FRANKLIN, WISCONSIN

SHEET TITLE:

EMP GAS PROBE AND GAS VENT LOCATIONS SAMPLED ANNUALLY (NOVEMBER)

DRAWN BY:	S. MAJOR	SCALE: AS NOTED	PROJ. NO. 376175.0000
CHECKED BY:	L. AUNER		FILE NO. 376175-006EMPgpgv.mxd
APPROVED BY:	M. WESTOVER	DATE PRINTED:	**FIGURE 7**
DATE:	JANUARY 2021		

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