



1969 Oakes Road, Racine, WI 53406
o 262.884.7081 f 262.884.7096 republicservices.com

November 7, 2025

Doug Coenen, P.E.
Waste Management Specialist
Waste and Materials Management Program
Wisconsin Department of Natural Resources
101 S. Webster Street HW/5
P.O. Box 7921
Madison, WI 53707-7921

Subject: Kestrel Hawk Landfill, Racine, WI (License #0572)
Feasibility and Plan of Operation Report for Long-Term Care

Dear Mr. Coenen:

Enclosed, please find the Final Feasibility and Plan of Operation Report, that our consultant, TRC Environmental Corporation prepared on our behalf. Please contact Khalid Umer at (224) 970-1127 or Todd Martin with TRC at (608) 622-9382 if you have questions regarding the submittal.

Sincerely,

Republic Services of Wisconsin, Limited Partnership

A handwritten signature in blue ink, appearing to read "Khalid Umer".

Khalid Umer, P.E.
Environmental Manager

cc: Todd Martin – TRC
Kestrel Hawk Landfill Master File

Certification Statement:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



M. Khalid Umer, P.E.
Environmental Manager

November 7, 2025

Doug Coenen, P.E.
Waste Management Engineer
Wisconsin DNR
PO Box 7921
Madison WI 53707-7921

Subject: Kestrel Hawk Landfill Application for Final Closure and Long-Term Care

Dear Mr. Coenen:

On behalf of Republic Services of Wisconsin, Limited Partnership, TRC is pleased to submit the Final Feasibility and Plan of Operation Report (FPOR). This Application was prepared according to the requirements provided by the Wisconsin Department of Natural Resources (WDNR) in the document entitled "Closure/Long Term Care Approval and Licensing Process" dated November 29, 2022. This final FPOR replaces the original submittal provided to the WDNR on April 4, 2025. This FPOR is identical to the April 4, 2025 version except for the following:

- Incorporated modifications submitted as part of the response to Request for Information (RFI) 1 provided to the WDNR on July 11, 2025,
- Incorporated modifications submitted as part of the response to RFI 2 provided to the WDNR on September 23, 2025,
- Modified Appendix Q.2 as the response to RFI 3 which was requested by the WDNR on October 15, 2025,
- Incorporated the minor updates to Section 1.2 of the FPOR as requested by Mr. Coenen,
- Incorporated request to remove five Appendix IX pesticides from the current monitoring program in Section 3.5.1.3.1 of the FPOR, and
- Updates to Appendix F.2, F.3, F.4, and Q.3 to reflect information, figures, and graphs presented in the 2024 Annual Report instead of the 2023 Annual Report.
- Updated environmental monitoring contractor name in Appendix N.

Enclosed within this submittal is the required FPOR narrative and associated appendices, required WDNR forms as stated in the document dated November 29, 2022, and "crosswalk" or checklist that provides an overlook of the requirements and the sections within the FPOR that address them.

The FPOR will be uploaded to the WDNR-provided Box link.

Paper copies of the Application are available upon request.

Republic Services of Wisconsin, Limited Partnership have previously paid all fees associated with this submittal.

Doug Coenen, P.E.
Wisconsin DNR
November 7, 2025
Page 2

If you have any questions regarding this submittal, please call me at (608) 622-9382.

Sincerely,

TRC



Todd W. Martin
Principal Project Manager

cc: Tony Peterson – WDNR
Benjamin Petrus – WDNR
Andrea Keller – WDNR
Angela Carey – WDNR
Kendra Fisher – WDNR
Norberto Gonzalez – EPA
Khalid Umer – Republic
Michael Gilligan – Republic
BreAnne Kahnk – TRC
Steve Sellwood – TRC



Feasibility Report and Plan of Operation

**Kestrel Hawk Landfill
Racine, Wisconsin**

November 2025

**WDNR License No. 0572
EPA ID No. WID076171008
FID No. 252076990**

Prepared For:

Republic Services of Wisconsin, Limited
Partnership
City of Racine, Racine County, Wisconsin

Prepared By:

TRC
999 Fourier Drive, Suite 101
Madison, Wisconsin 53717





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- A.4 – General Permit to Discharge (Tier 2 Industrial Facilities) – WPDES Permit No. WI-S067857-5 – May 14, 2021
- A.5 – Conditional Plan Modification Approval for Annual Reporting Requirements for Republic Services Kestrel Hawk Recycling and Disposal Facility (RDF), License #0572, Racine, Wisconsin – August 30, 2017
- A.6 – Modification to the Plan of Operation Approval for Gas and Leachate Extraction System, Land Reclamation Company Landfill, License #0572, Racine, WI – March 12, 1991
- A.7 – Environmental Monitoring Plan Modification to the Plan of Operation Approval and Hazardous Waste Closure Plan, and response to “Justification for Not Installing Additional Unit B Piezometers at LRC,” Land Reclamation Company Landfill, EPA ID# WID076171008 – February 7, 1994
- A.8 – Addendum to Notice of Noncompliance – Hazardous Waste Compliance Assessment – Kestrel Hawk Landfill – EPA ID WID076171008 – September 16, 2020

- A.9 – Conditional Plan of Operation Approval Modification for Adjusting Owner Financial Responsibility for the Kestrel Hawk Landfill, Racine County, License #0572 – August 23, 2024
- A.10 – Plan of Operation Approval for the Northwest Expansion of the Land Reclamation Company Landfill – August 30, 1996
- A.11 – Conditional Close Out – Hazardous Waste Compliance Assessment – Kestrel Hawk Landfill – EPA ID WID076171008 – June 4, 2021
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CERTIFICATIONS

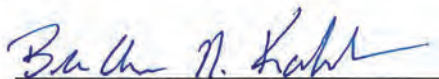
"I, Stephen Sellwood, hereby certify that I am a licensed professional geologist in the State of Wisconsin in accordance with the requirements of ch. GHSS 2, Wisconsin Administrative Code; that the preparation of this document has not involved any unprofessional conduct as detailed in ch. GHSS 5, Wisconsin Administrative Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 538 and chs. NR 664 and 670, Wisconsin Administrative Code."



Stephen Sellwood, P.G.
Professional Geologist No. 1228-13



"I, BreAnne N. Kahnk, hereby certify that I am a licensed professional engineer in the State of Wisconsin in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 538 and chs. NR 664 and 670, Wis. Adm. Code."



BreAnne N. Kahnk, P.E.
Professional Engineer No. 46825





1.0 General Facility Description

1.1 Introduction

On behalf of Republic Services of Wisconsin, Limited Partnership (Republic), TRC has prepared this Feasibility Report and Plan of Operation (FPOR) for Kestrel Hawk Landfill (License #0572) (KHL). This FPOR was prepared following the November 29, 2022 Closure/Long-Term Care Approval and Licensing Process Guidance Document and associated Attachments A, B, C that was provided to Republic by Wisconsin Department of Natural Resources (WDNR). This guidance document denotes that it applies to landfills regulated for Solid Waste and Hazardous Waste under chapter NR 500- and 600-series. This guidance document is included in **Appendix A.1** for reference. As required in the guidance document, a checklist or “cross-walk” has been developed to reference the locations of specified requirements. This “cross-walk” is provided in **Appendix B**. **Appendix C** includes WDNR Form 4400-117 “Solid Waste Facility Closure and Long-Term Care License Application” along with EPA Form 8700-12 “Site Identification Form” and the EPA Part A Form. Deed and legal property information are included in **Section 4.10**.

1.2 General Information

Facility Name	Kestrel Hawk Landfill WDNR License #0572 EPA ID# WID076171008 FID# 252076990
Facility Address	Kestrel Hawk Landfill 1969 Oakes Road Racine, Racine County, Wisconsin 53406-4680
Facility Location	KHL is located in the North ½ of Section 23, Township 3 North, Range 22 East, Racine, Racine County, Wisconsin. Refer to Figure 1 .
Facility Latitude/Longitude	Latitude: 42.708843° North Longitude: -87.864133° West
Facility Authorized Contract	Republic Services of Wisconsin, Limited Partnership Khalid Umer, P.E., Environmental Manager 26W850 Schick Road Hanover Park, Illinois 60133 Phone: (224) 970-1127
Facility Owner and Operator	Republic Services of Wisconsin, Limited Partnership 18500 North Allied Way Phoenix, Arizona 85054 Phone: (262) 417-9272

Consultant	TRC 999 Fourier Drive, Suite 101 Madison, WI 53717 Project Manager: Todd Martin Telephone: (608) 622-9382 E-mail: twmartin@trccompanies.com
Total Acreage	125.4 Acres <ul style="list-style-type: none">• Old Site (includes Hazardous Waste Unit): 70.1 acres• Northwest Expansion: 55.3 acres
Ceased Accepting Waste	December 2022
Indian Lands	KHL is not located on Indian Lands or Reservations. Refer to Figure 2 .
Floodplain	KHL is not located within a 100-year floodplain. Refer to Figure 3 .
Affected Municipalities	Racine, Wisconsin Mt. Pleasant, Wisconsin Racine County, Wisconsin
Endangered Resources Review	Facility is covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities and therefore does not require an Endangered Resources Review. Refer to Appendix S .

1.3 Site Background and History

1.3.1 General Background

KHL is in the City of Racine, Racine County, Wisconsin and is owned and operated by Republic. KHL consists of the Existing Landfill (also known as the Old Unit or Old Site) and the Northwest Expansion Landfill (Northwest Expansion). These unit boundaries are shown on **Figure 4**. Because KHL is located within the City of Racine, the surrounding land use of the landfill varies. Generally, residential properties are located to the north, northeast, east, and south of KHL property. Commercial and industrial developments are located to the southeast, southwest, and west of KHL property.

The Old Site and Northwest Expansion were acquired by Republic in 1998. Therefore, a majority of regulatory determinations, design, and implementation of closure activities for the hazardous waste unit (HWU) was performed between the late 1980s and mid-1990s when the landfill was owned by a different entity.

The Old Site is approximately 70.1 acres in size and consists of an encapsulated Resource Conservation and Recovery Act (RCRA) HWU (Corridors 1 through 6), the former City of Racine Landfill, and non-hazardous municipal solid waste units (Corridors 7/7A, Corridors 8, 9, and 10

[saddle area], and Corridor 11). Operations within the Old Site began in the early 1960s with the former City of Racine Landfill. In August 1970, operations of the former City of Racine Landfill were assumed by the Land Reclamation Landfill, Inc. Shortly after the change in operations, disposal activities within the former City of Racine Landfill ended and the site was covered. Waste disposal operations continued into Corridor 1 beginning in 1970, with Corridors 2 through 11 constructed incrementally until 1995. Additional information relating to the construction of the Old Site/HWU components, including timeline of initial construction, installed cutoff and barrier walls, and final cover installations, are provided in **Section 3.0** and **Appendix D**.

The Northwest Expansion occupies an area of approximately 55.3 acres and consists of Phases 1 through 5 and a vertical overlay area over the Old Site of approximately 9.5 acres. The Northwest Expansion, owned and operated by Land Reclamation Company at the time of permitting, received a NR 500 series Plan of Operation Approval in 1996 and was approved to accept non-hazardous municipal, commercial, and industrial solid wastes. The Northwest Expansion was constructed in phases over the following years.

KHL officially closed in December 2022 and construction of the last areas of final cover were completed in 2024.

1.3.2 History of Hazardous Waste Management

KHL previously operated as a hazardous waste large quantity generator. The landfill accepted hazardous wastes which were co-disposed with non-hazardous waste. In May 1975, WDNR issued the Land Reclamation Landfill (LRL) (currently known as KHL) a permit for the disposal of hazardous wastes at the site. LRL accepted hazardous waste beginning in the early to mid-1970s. LRL was granted an interim status with the United States Environmental Protection Agency (USEPA) as a hazardous waste disposal unit in 1980. By August 1982, LRL ceased acceptance of hazardous wastes and was denied continuance of the interim status by the WDNR in December 1982. As noted above, the HWU is comprised of Corridors 1-6, shown on **Figure 4**.

Complete data for hazardous waste disposed within Corridors 1 through 6 is limited due to the facility operating under a different organization at the time in which disposal occurred. However, the available summary of hazardous waste received at KHL from 1980 to 1982 is included in **Appendix E**.

Information relating to the construction of Corridors 1 through 6 is detailed in **Section 3.2.1**. A summary of closure activities for the HWU is detailed in the Closure Report for Corridors 1 through 6 provided in **Appendix D** and **Section 3.1.1**. The HWU is considered by the WDNR as inactive (WDNR, 2004) and is effectively closed by the existing final cover system, barrier wall, and containment structure. The HWU is managed for long-term care conditions with the maintenance of the final cover system and operating the leachate and landfill gas collection systems.

As detailed above, KHL no longer accepted hazardous waste following 1982. However, generation of hazardous waste continues due to the leachate removed from the HWU and collection of impacted groundwater associated with the HWU. These liquids are discharged to the Racine Wastewater Utility sanitary sewer system (City of Racine sanitary sewer) in compliance with the industrial wastewater discharge permit (**Appendix A.2**). In addition to these liquids, hazardous waste is periodically generated during the maintenance of equipment in contact with leachate in the HWU and annual oily substance removal events. These materials are

containerized and shipped off-site for incineration by Safety-Kleen. Refer to the June 12, 2020 Hazardous Waste Generation Report prepared by TRC, and submitted to WDNR, for details regarding the management of produced hazardous waste. **Table 1** provides an updated quantities list which includes reported values to 2024.

1.3.3 Corrective Action Status

Corrective action per s. NR 664.0100 and s. NR 664.0101 is ongoing at KHL within the 141U area located southeast of KHL's limits of waste due to exceedances of vinyl chloride. Historical waste management activities are known to have resulted in the detection of vinyl chloride in groundwater in a saturated, confined Unit A sand lens. The vinyl chloride impacts were first identified in monitoring well 141U prior to 1990; therefore, this remedial area is referred to as the 141U area.

The USEPA initiated a RCRA Corrective Action at the site through a Consent Order obligating the site owners to perform a RCRA Facility Investigation (RFI), and if appropriate, an RCRA Corrective Measures Study (CMS) and Corrective Measures Implementation (CMI). KHL performed an RFI for the 141U Area in 1993 and 1994. A draft RFI report was submitted to the USEPA and the WDNR (Law, 1996). The RFI defined the extent of groundwater impacts and demonstrated that groundwater could be controlled and remediated by an extraction system consisting of three groundwater recovery wells with discharge to the landfill's leachate transfer system. KHL installed the extraction system in late 1995 and consists of three groundwater extraction wells (R5, R6R, and R7). The groundwater extraction system has operated nearly continuously since April 1996. The groundwater extraction system is depicted on Sheet 1 contained in **Appendix F.1** from the 2024 Groundwater Remediation System Alteration Construction Observation letter prepared by Foth Infrastructure and Environment. The Corrective Action activities are further detailed in **Sections 3.9** and **7.2**.

1.4 Environmental Licenses, Permits, and Authorizations

As required by s. NR 670.013(11), a summary of available permits, licenses, and construction approvals received related to the Hazardous Waste Unit are provided in **Table 2**.

1.5 Miscellaneous FPOR Requirements

Per the guidance document, several general drawings are requested within this FPOR. These include:

- s. NR 670.014(2)(s): A topographic map showing a distance of 1,000 feet around the facility...
- s. NR 670.013(8)(a): A scale drawing of the facility showing the location of all past, present, and future treatment, storage, and disposal areas.
- s. NR 670.013(8)(b): Photographs of the facility clearly delineating all existing structures; existing treatment, storage, and disposal areas; and sites of future treatment, storage, and disposal areas.

- s. NR 670.013(12): A topographic map extending one mile beyond the property boundaries of the source depicting the facility and each of its intake and discharge structures; each of its hazardous waste treatment, storage or disposal facilities; each well where fluids from the facility are injected underground; and those wells, springs, other surface water bodies, and drinking water wells listed in public records or otherwise known to the applicant within ¼ mile of the facility property boundary.

The conformance or exclusion of these items is further detailed below.

1.5.1 s. NR 670.014(2)(s) and s. NR 670.013(8)(a)

Figure 4 denotes the locations of each of KHL's landfilling areas as described in **Section 1.3**. This complies with the requirements of by s. NR 670.013(8)(a). In addition, detail required by s. NR 670.014(2)(s) are included on **Figure 4** with the following exceptions:

- A slightly larger scale of 1-inch equals 250 feet was utilized to show the areas surrounding the landfill as a hole. Utilizing a smaller scale may remove some outlying features from the view area.
- Surrounding land uses are depicted on **Figure 4A** for clarity.
- A wind rose showing the prevailing wind-speed and direction is not provided as it is unlikely to provide pertinent value under the subject of this FPOR for long-term care.
- The location of the HWU is provided; however, descriptions pertaining to its legal description are not included on this figure as it is unlikely to provide pertinent value under the subject of this FPOR. No other hazardous waste storage areas are located on site.
- Barriers for drainage and flood control are not applicable to this site and therefore not shown.

No future treatment, storage, or disposal areas are proposed and therefore not depicted.

1.5.2 s. NR 670.013(8)(b)

Section NR 670.013(8)(b) requires that photographs be provided detailing all structures located at KHL. Typical photographs of KHL and associated infrastructure are provided in **Appendix G**. No future treatment, storage, or disposal areas are proposed within KHL as the landfill is closed and hazardous waste has not been accepted at KHL since 1982.

Construction documentation reports have been submitted to the WDNR detailing construction activities both within the HWU and outside the HWU at KHL. These submitted and approved documentation reports also include photographic documentation of constructed facilities at KHL related to the HWU and are sufficient to comply with this requirement.

1.5.3 s. NR 670.013(12)

Section NR 670.013(12) requires a topographic map that extends 1 mile beyond the property boundary and depicts several features such as the facility boundary, intake and discharge structures, the hazardous waste disposal and treatment facilities, wells where fluids are injected underground, along with wells and natural water sources. It is likely that a map at this scale will not provide additional value to the WDNR. **Figure 1** provides a topographic map which includes



an area within 1 mile of KHL's limits of waste along with a depiction of the limits of waste and the location of water wells from the Wisconsin DNR well map. However, detailed information is not provided as it would be difficult to distinguish at this scale. Residential and industrial properties generally encompass the 1-mile radius around KHL, land uses for areas within 1,000 feet of the limits of waste are depicted on **Figure 4A** as required by s. NR 670.014(2)(s). Natural resources for areas within 1,000 feet of the limits of waste are depicted on **Figure 4**.

KHL does not have future plans for expanding its hazardous or solid waste management activities, and hazardous waste has not been accepted since 1982. No fluids are injected underground at the landfill property and discharges of leachate are routed to the City of Racine sanitary sewer system with only stormwater discharges routed overland.

2.0 Long-Term Care Summary

Sections 2.0 and **3.0** of this FPOR are inter-related with each other. **Section 2.0** provides general details of the systems and their components requiring long-term care. In addition, a general overview of the maintenance and repair activities that will be required for each system will be detailed. In **Section 3.0**, these systems are discussed in further detail along with specific details relating to the required inspection, maintenance, monitoring, and repair activities.

2.1 Long-Term Care General

KHL is comprised of various environmental control and management systems that will be required to be maintained throughout the long-term care period. Republic is required to monitor and maintain these systems following closure activities for 40 years or until WDNR approves cessation of these activities. In addition to the landfill control and management systems, the corrective actions systems in place will also be monitored and maintained until WDNR approves a “no further action” status for the corrective action system.

In general, the long-term care components for KHL include the final cover, leachate and gas collection, stormwater controls (run-on and run-off management system), groundwater management and containment, and corrective action activities. These components are summarized in the following subsections and detailed in **Section 3.0**.

2.2 Final Cover

The final cover system is a barrier, whether soil only or a composite system, which separates the interred waste from the outdoor environment. At KHL, the final cover system was constructed over several different construction events, resulting in differing final cover makeups over the years. These construction events consist of four main final cover categories, which include:

- NON-RCRA covers (1991-1993): 6 inches of topsoil, 4 feet of compacted clay.
- RCRA covers:
 - 1990-2001: 6 inches of topsoil, 1.5 feet of general fill, geotextile filter, 1 foot of sand, 40 mil very low-density polyethylene [VLDPE] geomembrane, 3 feet of compacted clay.
 - 2023-2024: 6 inches of topsoil, 2.5 feet of general fill, geocomposite drainage layer, 40 mil low linear density polyethylene [LLDPE] geomembrane, geosynthetic clay liner [GCL], 2 feet of compacted clay.
- NR 180 covers (1994-2001): 6 inches of topsoil, 2 feet of general fill, and 2 feet of compacted clay.
- NR 500 covers:
 - 2002-2022: 6 inches of topsoil, 2.5 feet of general fill, geocomposite drainage layer, 40 mil LLDPE geomembrane, GCL, 2 feet of soil barrier layer.
 - 2023-2024: 6 inches of topsoil, 2.5 feet of general fill, geocomposite drainage layer, 40 mil LLDPE geomembrane, 2 feet of compacted clay.

Following installation of the final cover system, the areas were mulched, fertilized, and vegetated. Stormwater controls (run-on and run-off controls) designed to protect the final cover against erosion were installed during final cover construction and are further detailed in **Section 2.4**.

In addition to the final cover system, KHL has several separation barrier walls installed between the HWU and non-hazardous portions of the landfill. These barrier walls extend from the liner system or native underlying clay to the final cover system to encapsulate the HWU from non-hazardous waste areas. The North Barrier Wall is located along the southern boundary of Corridor 7, whereas the West Barrier Wall is located along Corridors 8, 9, and 10.

Long-term care activities associated with the final cover system consist of inspections, settlement monitoring (to ensure that positive drainage is maintained), and repairs. In addition, general maintenance of the vegetated surface and access roads are also required. The final cover system and its associated components along with details pertaining to long-term care activities are further detailed in **Section 3.1**.

2.3 Leachate and Gas Collection and Control Systems

2.3.1 Leachate System and Conveyance

A leachate containment/collection system consists of landfill infrastructure that is designed to keep leachate within the waste unit to the extent practicable to allow for the managed collection of generated leachate. At KHL, this infrastructure includes base liners and cutoff walls that were designed to minimize the potential of leachate migration outside the waste limits or the migration of leachate from HWU into the adjoining non-hazardous waste units. In addition, collection and extraction infrastructure were designed to remove leachate from the waste mass and convey the liquids to the City of Racine sanitary sewer discharge locations. These systems will continue to operate throughout the long-term care period or until WDNR approves their discontinuation.

At KHL, the collection and extraction system consist of both vertical extraction wells and horizontal leachate collection lines, as further detailed in **Section 3.2.1**. Extracted leachate is routed from the waste mass into a conveyance system, which routes the leachate and other extracted liquids (condensate/groundwater) to the City of Racine sanitary sewer for discharge via constructed manholes and lift stations.

In addition to the extraction system, leachate headwells are installed to monitor leachate head levels within KHL. Leachate headwells within the HWU are evaluated annually against four performance criteria to evaluate the effectiveness of the leachate removal in the HWU. These performance criteria/goals are summarized in **Section 2.3.1.1** and further detailed in **Section 3.2.2**.

2.3.1.1 Leachate Management and Extraction Goals

The overall goal of the leachate collection system is to reduce leachate head levels within the Old Site. During the development of the 2005 Old Site Hydrogeologic Evaluation (RMT, 2005a), a detailed assessment of the leachate extraction system performance was conducted. Following this evaluation, 4 criteria were established to evaluate the effectiveness of the extraction system within the Old Site through a WDNR Plan Modification approval dated, December 28, 2005 (**Appendix A.3**). The criteria are as follows:

1. Maintain decreasing head levels across the site on an area weighted average as indicated by the slope of the least-square trend line.
2. Maintain decreasing heads as indicated by the slope of least-square trend line for the eight-point moving average in the long-term trend analyses in 75 percent of the leachate headwells.
3. Maintain decreasing heads as indicated by the slope of the least-square trend line in the short-term trend analyses in 67 percent of the leachate headwells.
4. Remove more leachate by extraction from the hazardous waste unit than is entering the hazardous waste unit on an annual basis.

In addition to the above criteria, the 2005 approval from WDNR also required that polychlorinated biphenyls (PCB) oil product in the leachate or any other oil product is removed from the leachate extraction wells and headwells and properly disposed of according to its characteristics and classification. This removal is completed on an annual basis and will continue during the long-term care period.

2.3.1.2 Leachate Long-Term Care Activities Summary

Long-term care activities associated with the leachate collection and conveyance system consist of regular inspections and maintenance. Regular inspections of associated manholes, lift stations, and pumping equipment is required to confirm that extraction activities continue as designed. In addition, continued evaluation of the effectiveness of the HWU extraction is required through the monitoring of leachate head levels within the HWU along with the other waste areas of KHL. Leachate lines within the Old Site and Northwest Expansion require regular cleaning to remove blockages and reoccurring video inspections to confirm the condition of subsurface piping. The leachate collection system long-term care activities is further detailed in **Section 3.2.3**.

2.3.2 Gas Collection and Control System

The gas control system operates to control emissions and migration of landfill gas and to allow for energy recovery. The gas system within the HWU and former City of Racine Landfill operates in conjunction with the rest of KHL gas system. The gas system is further detailed in **Section 3.3.1**.

Gas collected from KHL is routed to the on-site biogas facility. A compressor located at the Biogas East Facility withdraws gas from the extraction wells and directs it to the Biogas West Facility. At the Biogas West Facility, the landfill gas is directed to either the S.C. Johnson Inc. facility for energy recovery and/or burned at a utility flare.

Monitoring probes are located around the perimeter of KHL to detect against off-site migration of landfill gas. Monitoring of the probes is conducted in accordance with KHL's environmental monitoring program as detailed in **Sections 2.5** and **3.5**.

Long-term care activities associated with the gas collection and control system consist of inspection and maintenance. Regular inspections of the extraction wells, valves, blowers, and flares is required to confirm that extraction activities continue to perform as designed. The gas collection and control system long-term care activities are further detailed in **Section 3.3.2**.

2.4 Run-on and Run-off Control Systems

Run-on and run-off control systems consist of the surface water management infrastructure constructed at a landfill. This infrastructure assists in routing surface water away from the landfill and controls run-off as it leaves the landfill area. As KHL is closed, with final cover fully constructed, these run-on and run-off systems assist in managing storm water and surface water runoff to minimize erosion and damage. The surface water management system components consist of diversion berms, ditches, culverts, flumes, final cover drains, sedimentation basins, and other erosional control methods. Surface water from the final cover system is routed through the diversion berms, downslope flumes, and perimeter drainage ditches to sedimentation basins located around the perimeter of the landfill. Surface water contained within the sedimentation basins is discharged through outfalls associated with the site as allowed per KHL's Wisconsin Pollutant Discharge Elimination System (WPDES) Permit (**Appendix A.4**). These components are further detailed in **Sections 3.4.1, 3.4.2, and 3.4.3**.

Throughout the long-term care period for KHL, maintenance of the surface water management components will be required. This maintenance includes regular inspections to evaluate the condition of the components, to identify potential sediment buildup, and to determine whether repairs are needed/warranted for a specific component.

Additional detail pertaining to the surface water management system long-term care requirements is provided in **Section 3.4.4**.

2.5 Environmental Monitoring

Environmental monitoring consists of the general monitoring and sampling of environmental protection infrastructure including groundwater wells, the leachate system, gas system, surface water management system, and gradient control system (Northwest Expansion only). The current environmental monitoring program will continue to be performed during long-term care unless a modification is approved by the WDNR.

The most recent plan modification summarizing the environmental monitoring requirements is dated August 30, 2017 (**Appendix A.5**) and is shown on **Figure 5**. Groundwater, gradient control system, leachate, leachate head elevations, surface water, gas, and surface settlement monitoring will be performed. The sampling will be conducted in general accordance with the previously approved sampling plan for the Northwest Expansion (**Appendix H**). The sample analytical methods will be consistent with NR 507 and NR 664. These monitoring programs are further detailed in **Section 3.5**.

2.6 Groundwater Collection and Containment

A groundwater containment structure was constructed to prevent possible migration of leachate/contaminated water from the unlined portions of the HWU. The containment structure extends along the western and southern perimeter of the HWU and includes perforated piping that conveys the captured groundwater/leachate to removal locations.

Long-term care activities associated with the groundwater collection and containment system consist of regular inspection and maintenance of associated manholes and pumping equipment along with cleaning of groundwater collection piping. The containment and collection system along with details pertaining to long-term care activities is further detailed in **Section 3.6**.

2.7 Corrective Action

Corrective action at KHL is ongoing and will continue during long-term care until remedial objectives have been met. The corrective action measures include groundwater extraction through recovery wells located in the 141U area. A general summary of the corrective action program is included in **Section 1.3.3**. Associated groundwater monitoring is conducted to verify the effectiveness of the remedial system which consists of the corrective action system and the groundwater contaminant system (**Section 2.6**).

Supplemental corrective action activities that would occur during the long-term care period consist of inspections and general maintenance of the system. Systems components (such as pumps) would be replaced or repaired as necessary.

The corrective action program and associated activities are further detailed in **Section 3.9**.

3.0 Long-Term Care Details

This section will provide specific information relating to the systems summarized in **Section 2.0** and their requirements pertaining to long-term care.

The following subsections detail the different components requiring long-term care for KHL. In addition to the inspections, maintenance, and repairs required for these components, general site inspections will be completed at the landfill during the long-term care period. The entire KHL will be inspected annually for the 40-year long-term care program. Written records of these inspections are to remain at the facility. These inspections evaluate the components of KHL and assess their need for maintenance and repairs. Maintenance and repairs identified from these inspections are documented along with corrective actions taken and are discussed in the Annual Report submitted for the entire KHL landfill as specified in **Section 4.9**.

3.1 Final Cover

3.1.1 Final Cover, Perimeter Berms, and Separation Barrier Design

The final cover system installed at KHL was completed through multiple construction events. In addition, dependent on the location and timing of the construction event, different final cover configurations have been utilized across KHL footprint.

Both composite final cover systems and soil only final cover systems have been constructed at KHL. Soil only covers are generally located in the cover areas that were constructed initially, which include the Former City of Racine Landfill and the outboard slopes of the HWU (Corridors 1-6), Corridors 7/7A, and Corridors 8-10. These systems consist of compacted clay overlain by general fill and topsoil. The remaining areas of KHL, including the interior portions of the Old Site and Northwestern Expansion, consist of composite cover systems that include geosynthetic materials (geomembrane, GCL, and/or geocomposite) in addition to the soil components. The respective cover system areas for KHL are depicted on **Figure 6**, which provides the extents of each cover event along with details relating to the associated documentation report and cover configuration.

In addition to the final cover areas, separation barriers and perimeter berms encapsulate and buttress the HWU and non-hazardous waste landfilling units. Separation barriers were constructed in the HWU to separate the interred hazardous waste from non-hazardous waste placement that occurred post 1982. The separation barriers (barrier walls) were constructed around the northern and western perimeter of the HWU. The barrier walls consist of a 7-foot-thick (measured perpendicular to the slope) compacted clay liners that were constructed at a 3-foot horizontal by 1-foot vertical (3:1) slope. The approximate locations of the barrier walls are depicted on **Figure 6**. The barrier walls are keyed into the existing compacted clay liner of Corridor 6 and into the native clay soils along the perimeter of the HWU. Within Corridors 8, 9, and 10, the composite liner ties into the side slope of the barrier wall. Sand drainage layers were installed on either side of the clay barrier wall to provide drainage for leachate and minimize the hydraulic pressure against the barrier wall. The barrier walls were constructed incrementally from 1987 through 1996 as KHL expanded. Documentation of the barrier wall construction was provided to the WDNR with approvals received from WDNR, which are listed in **Appendix D**.

Perimeter berms around KHL, including the HWU areas, were typically constructed at the time of the cell excavation. The final cover was ultimately tied into the perimeter berms during closure

events, encapsulating the waste. The perimeter berms have been observed to be stable following construction. No stability concerns have been noted during site inspections.

3.1.2 Final Cover and Access Road Long-Term Care Activities

Long-term care activities associated with the final cover system and its associated structures consist of inspections, settlement monitoring, and general repairs and maintenance.

The final cover system and perimeter berms are to be inspected as detailed in the Inspection Manual (**Appendix I**). During the inspections, areas in need of maintenance or repairs are to be noted, and the appropriate corrective action determined and recorded. Recorded maintenance/repair activities are to be completed on a timely basis.

Throughout the long-term care period the final cover system typical maintenance activities are to be completed to maintain the integrity and functionality of the final cover system. Maintenance activities include mowing/grazing, cleaning out diversion berm ditches (**Section 3.4**), and maintenance of the access road, including snow plowing during the winter months. The final cover system should be mowed annually at a minimum, with additional mowing events as needed throughout the year to maintain vegetation height and prevent the development of woody vegetation. Snow plowing is to be completed on an as needed basis, as it is dependent on the weather and landfill access requirements.

Repairs will be completed on an as needed basis, depending on the condition of the final cover system. Settlement, erosion, or areas of ponding are to be repaired to maintain the integrity of the final cover system. Dependent on depth and location, select clay fill may be required to fill and rework the compacted clay layer of the final cover system. Settlement, cracking, and erosional areas should be brought to grade with similar materials as used in the final cover. It is anticipated that the rate at which settlement or erosional repairs are needed will reduce as the site stabilizes.

If settlement impacts the flowline of the diversion berm ditches, regrading of the final cover will be necessary to restore positive drainage. Recently filled and covered areas will likely require the most maintenance; however, as the landfill stabilizes, maintenance requirements are expected to reduce. Additional minor repairs, such as refinishing portions of the access road or repairs to final cover drainage structures (diversion berms as noted in **Section 3.4** or drain pipes) may be required and are to be completed on an as needed basis. Settlement monitoring will be completed visually with depressed areas being repaired as noted above.

Areas that have been repaired or areas with distressed or missing vegetation will require re-establishment of vegetative cover. Barren areas noted during the site inspections will also require repair (preparing topsoil, fertilizing, seeding, and placing mulch or erosion control feature). Reworked surfaces and areas of failed or eroded vegetation will be revegetated. As with cover repairs, it is anticipated that the rate of revegetation will be reduced after the site stabilizes.

3.2 Leachate Management

3.2.1 Leachate Collection and Conveyance System

Leachate management at KHL is completed using several landfill infrastructure systems. The base liner and cutoff walls provide containment of leachate within the waste mass, the

extraction/collection system provide the means for removing leachate for discharge into the conveyance system, and the conveyance system routes the removed leachate to the discharge location (City of Racine sanitary sewer). These systems were developed and expanded over the course of landfill construction and improved as regulations are implemented. During long-term care, extraction of leachate will continue as required by the WDNR.

The liner system is used to prevent migration of leachate from the waste area. The older areas of the Old Site were constructed prior to regulations being enacted. Therefore, not all areas of the Old Site have engineered base liners (former City of Racine Landfill, Corridor 1, Corridor 2, Corridor 3, and Corridor 4). The remaining areas of the Old Site along with the Northwest Expansion were developed with compacted clay or composite liner systems. Subsurface leachate collection systems were installed starting in Corridor 4, no subsurface leachate collection system was installed in the former City of Racine Landfill or Corridors 1 through 3. The estimated liner areas, their construction dates, and approximate barrier wall (which also assist in the containment of leachate) construction areas are depicted on Figure A-1 from the 2005 Hydrogeologic Evaluation provided in **Appendix J.1**.

The former City of Racine Landfill began operations in the 1960s. A summary of the known construction information was included as part of the 2005 Hydrogeologic Evaluation Summary Report (excerpt provided in **Appendix J.1**). No liner system was constructed prior to waste placement, and it is estimated that the base of the City of Racine Landfill is at an approximate elevation of 658. In 1971, an estimated 14-foot-deep clay cutoff wall was installed on the western side of the former City of Racine Landfill based on a chronology prepared for the Land Reclamation Company draft to the Proposed Consent Order, dated December 21, 1990. The cutoff wall was installed with the intent of preventing horizontal migration of leachate from the landfill through permeable soil layers within the subsurface. Following waste disposal activities, leachate extraction was initiated at the landfill through 5 vertical leachate/gas extraction wells. Pumped leachate is gravity drained to nearby leachate manholes for conveyance to the City of Racine sanitary sewer.

A summary of known construction information for the HWU (Corridors 1 through 6) is provided in **Appendix J.1**. Additional information related to the Corridors is presented below.

- Corridor 1: Approximate base elevation of 680.
- Corridor 2: Approximate base elevation of 648.
- Corridor 3: Approximate base elevation of 654.
- Corridor 4: Base of this corridor varies from approximate average elevations 642 to 662. Single leachate collection line is connected to manhole MH1.
- Corridor 5: Base grade elevations of approximately 655 to 670 and the leachate piping is connected to manhole MH1.
- Corridor 6: No other information from what is presented in the appendix.

Within the vertical extraction system in Corridors 1 through 3, extracted leachate is routed through gravity drain piping toward manhole MH10. The leachate extraction conveyance design in the HWU is further detailed in system summaries provided in the Inspection Manual (**Appendix I**).

During development of Corridors 7/7A and Corridors 8, 9, and 10, barrier walls were installed to encapsulate the HWU (Corridors 1 through 6). The barrier walls are summarized in **Section 3.1.1** and consist of a 7-foot-thick compacted clay liner constructed at an approximate 3:1 slope. The North Barrier Wall, built in conjunction with Corridors 7/7A and Corridor 11, was constructed from 1987 to 1992. The West Barrier Wall, in Corridors 8, 9, and 10 (also known as the saddle area), was constructed from 1992 to 1995.

South of the HWU (Corridors 1 through 6) is a groundwater containment structure that was installed to prevent migration of leachate from the unlined portion of the HWU. The groundwater containment structure is detailed in **Section 3.6**.

The Corridors 7 through 11 of the Old Site and the entire Northwest Expansion are considered non-hazardous solid waste units. Each of these units were constructed with both base liner systems and leachate collection systems. Within the Old Site, Corridor 7/7A was constructed between 1979 and 1987 in conjunction with the North Barrier Wall. A 5-foot-thick compacted clay liner was constructed on the base of the landfill and a 7-foot-thick compacted clay liner was constructed on the side slopes. Two horizontal leachate collection lines were installed connecting to manhole MH2. Corridors 8, 9, and 10 (saddle area) were constructed in 1995 with a composite liner consisting of 5 feet of compacted clay and a 60 mil HDPE geomembrane. The West Barrier Wall was constructed into this saddle area and one leachate collection line was installed. Corridor 11 was constructed in phases from 1989 to 1992 with up to 10 feet of compacted clay on the base and 5 feet of compacted clay on the side slopes. Four horizontal collection lines were installed in Corridor 11 (RMT, 2005b). **Figure 7** details the routing for the leachate collection system within the Old Site.

The Northwest Expansion area was developed with a composite liner system and horizontal leachate collection lines within each landfill phase. The layout of the leachate collection system in the Northwest Expansion is shown on **Figure 8**.

Outside the limits of waste, the extracted leachate from the Old Unit is routed to manhole MH15B through a dual-contained leachate transfer pipe via lift stations. From manhole MH15B, the combined liquids are conveyed to the City of Racine sanitary sewer for discharge. The leachate conveyance system is depicted on the flow chart presented on **Figure 9**. This process is repeated for the Northwest Expansion; however, the leachate is routed to manhole LV-6 and ultimately to the existing City of Racine manhole MH-7.

3.2.2 Leachate Management and Extraction Standards

The overall goal of the leachate extraction system is to reduce head levels within KHL. In the October 2005 Plan Modification entitled Plan Modification Request for Old Unit [Site] Leachate Extraction System (RMT, 2005b), four technical criteria were proposed for evaluating the effectiveness of the HWU leachate extraction system and for demonstrating progress in limiting impacts to the environment (i.e., reducing head levels). As noted in **Section 2.3.1.1**, the general criteria as approved by the WDNR are as follows:

1. Maintain decreasing head levels across the site on an area weighted average as indicated by the slope of the least-square trend line.

2. Maintain decreasing heads as indicated by the slope of least-square trend line for the eight-point moving average in the long-term trend analyses in 75 percent of the leachate headwells.
3. Maintain decreasing heads as indicated by the slope of the least-square trend line in the short-term trend analyses in 67 percent of the leachate headwells.
4. Remove more leachate by extraction from the hazardous waste unit than is entering the hazardous waste unit on an annual basis.

The criteria were proposed to include a statistical evaluation of leachate heads on an area-weighted basis, a statistical evaluation of long-term leachate heads on a well-by-well basis, a statistical evaluation of short-term leachate heads on a well-by-well basis, and an evaluation of the HWU liquid balance (inflows versus outflows).

During the 2005 hydrogeologic evaluation of the Old Site, it was determined that the HWU and former City of Racine Landfill were protective of human health and the environment that evaluation the leachate collection system effectiveness should be completed through the determination of meeting the criteria listed above instead of the previous condition which required removal of leachate from all portions of the HWU to the greatest extent possible on a seven day per week basis. These criteria allow for a more thorough evaluation of effectiveness over the long-term and better understanding where changes need to occur, if required. The statistical methods to be used when evaluating if the four criteria have been met are detailed in the October 10, 2005 Plan Modification Report.

The effectiveness and performance of the leachate extraction system in the HWU is evaluated annually as part of the general annual report for KHL (**Section 4.9**). Associated tables, graphs, and figures are provided on an annual basis to determine compliance with the criteria. In addition, every five years, a comprehensive review of the leachate extraction system, which evaluates the entire extraction system, is performed. This five-year review provides a review in the following:

- leachate extraction system,
- assumptions associated with the calculations of leachate head levels and leachate removal,
- leachate quality relative to Unit B groundwater quality,
- summary of the breakthrough of indicator parameters in the Unit B monitoring wells down-gradient of the landfill, if present, and
- provides recommendations, if any, for more extensive response actions.

Compliance with the abovementioned performance criteria and the annual evaluation of the HWU effectiveness will continue through the long-term care period.

3.2.3 Leachate Collection and Conveyance Long-Term Care Activities

Long-term care activities associated with the leachate collection and conveyance system consist of inspections, monitoring, general repairs and maintenance. Leachate sampling and head monitoring are detailed in **Section 3.5.3**. Leachate disposal through the City of Racine sanitary sewer will continue through the long-term care period.

Inspections for the leachate collection system and associated lift stations and manholes are to be completed as detailed in the Inspection Manual (**Appendix I**). During the inspections, the need for maintenance or repairs are to be noted and the appropriate corrective action determined and recorded. Recorded maintenance/repair activities are to be completed on a timely basis. For the entire KHL, inspections of the leachate collection system (manholes, forcemains, extraction wells, and pumps) will be completed.

Throughout the long-term care period maintenance activities will be completed to maintain the integrity and functionality of the leachate collection and conveyance system.

- The leachate extraction pumps will be serviced.
- Cleaning of leachate collection lines will be completed annually, except as noted below, or as needed to maintain flow through the pipes. Leachate conveyance piping associated the vertical leachate extraction system along with the eastern perimeter gas header piping are to be jetted biennially as required by the WDNR approval letters dated March 12, 1991 (**Appendix A.6**) and February 7, 1994 (**Appendix A.7**).
- Every 5-years the leachate lines will be televised to confirm the condition of the horizontal leachate lines and identify blockages that cannot be removed through the cleaning process.
- Additional maintenance/compliance activities that will be required through the long-term care period include the annual removal of PCB oil product from the leachate extraction wells and headwells.

Repairs to the system will be completed on an as needed basis. Repairs typically would include pump replacement and repairs to lift stations and manholes that are accessible from outside the waste mass.

3.3 Gas Collection Management

3.3.1 Gas Collection System

The gas control system operates to control emissions and migration of landfill gas along with energy recovery. The gas system within the HWU and former City of Racine Landfill operates with the Northwest Expansion and remaining portion of the Old Site gas systems. Within the HWU and former City of Racine Landfill, the gas collection and leachate extraction system are primarily operated out of the same extraction wells. Within the HWU, the gas control system components are detailed in the *Description of the Old Site Landfill Design* excerpt of the 2005 Hydrogeologic Evaluation in **Appendix J.1**.

In general, the vertical extraction wells (landfill gas or leachate/landfill gas) are located throughout the HWU, the former City of Racine Landfill, the remaining corridors of the Old Unit, and the Northwest Expansion and are connected to the landfill gas header pipe system which routes the collected gas to the biogas buildings. At the Biogas West Facility, landfill gas is directed to either the S.C. Johnson Inc. facility for energy recovery and/or to a utility flare. The utility flare is located at the Biogas West Facility. Combined leachate/landfill gas extraction wells are predominately located in the Old Site, and can be located within KHL based on liquids levels present in landfill gas wells. Four horizontal gas extraction trenches are located near the west and north barrier walls encapsulating the HWU. These trenches include wellheads that connect with the landfill

gas header system to transport the collected gas. The gas collection trenches (GT-1 and GT-2) near the North Barrier Wall are monitored; however, monitoring no longer occurs in the trenches near the West Barrier Wall. The layout of the gas extraction wells and monitored collection trenches and their associated header piping is depicted on Figure 1 in **Appendix K**. The other collection trenches, extraction wells/monitoring points, and the biogas buildings are also depicted on **Figure 4**.

Condensate generated during landfill gas extraction operations is directed to drip legs located around KHL and is removed from the landfill as leachate. Condensate collected in drip legs is routed to lift stations associated with the leachate and groundwater collection system and is combined with the leachate extracted from KHL. The condensate is conveyed for discharge as detailed in **Section 3.2.1**.

Monitoring of gas migration is conducted through the gas probes located around the perimeter of KHL. A migration control trench was installed on the eastern perimeter of the HWU with wellhead connections to allow for a vacuum to be applied to the trench if gas is detected. Landfill gas monitoring will be completed throughout the long-term care period and is further detailed in **Section 3.5.5**.

3.3.2 Gas Long-Term Care Activities

Long-term care activities associated with the landfill gas collection and control system consist of inspections, monitoring, and general repairs and maintenance. Gas monitoring is detailed in **Section 3.5.5**.

Inspections for the gas collection system are to be completed as detailed in the Inspection Manual (**Appendix I**). During the inspections, necessary maintenance or repairs are to be noted and the appropriate corrective action determined and recorded. Recorded maintenance/repair activities are to be completed on a timely basis. For the entire KHL, inspections of the gas collection system (extraction wells, flare, blower, etc.) will be completed during monitoring events.

Throughout the long-term care period maintenance activities will be completed to maintain the integrity and functionality of the gas collection system. The landfill gas blower and flare will be serviced annually. Equipment at the biogas and blower building will be inspected and serviced monthly. Vacuum through the landfill gas system will be balanced as needed to prevent the migration of landfill gas outside KHL. KHL will maintain applicable air permits during the operation of the landfill gas extraction system, renewals of existing permits will be completed on an as required basis. Repairs to the system will be completed on an as needed basis. Repairs typically would include header or extraction well replacement or the addition of new extraction wells into the landfill.

3.4 Run-On and Run-Off Controls

Run-on and run-off controls consist of the surface water management components installed at KHL as noted in **Section 2.4**. These components consist of diversion berms, ditches, culverts, flumes, sedimentation basins, and other erosional control methods.

3.4.1 Diversion Berms and Downslope Flumes

Diversion berms and downslope flumes are installed across the final cover system of KHL to assist in managing runoff from the landfill final cover and minimize infiltration into the underlying waste. The diversion berms are placed to minimize the flow distance of run-off from the final cover system. The distances between berms are determined on the slope of the final cover with steeper slopes requiring rows of diversion berms closer together than shallower slopes. The diversion berms assist in reducing velocity of surface water as it flows across the cover system, minimizing the potential for erosional velocities to develop, protecting the final cover system. Associated with the diversion berms, drain pipes are installed within the final cover to convey infiltrated water trapped above geomembranes to the perimeter storm water infrastructure. Approximate locations of diversion berms within KHL are provided in **Appendix L.1**.

Diversion berms are sloped to discharge collected surface water in the diversion berm ditch to the downslope flumes. The diversion berms were installed in phases as the final cover system was installed and their locations are detailed in the construction documentation for each final cover construction. Examples of the construction of the diversion berms from different final cover configuration construction events is provided in **Appendix L.2** through **Appendix L.5**.

The diversion berms convey the surface water to downslope flumes. The downslope flumes include multiple entrances so that several diversion berms along the slope can be routed to centralized flume locations. The downslope flume piping is installed within the final cover system and conveys collected surface water downslope to the perimeter drainage ditches. The flumes discharge through concrete weir structures located within the perimeter drainage ditches and assist in reducing the discharge velocity to protect the perimeter drainage ditches from erosion. An example of a downslope flume and discharge structure installed during the construction of the final cover system along the slopes of the Former City of Racine Landfill is provided in **Appendix L.4**.

3.4.2 Perimeter Drainage Ditches and Culverts

Perimeter drainage ditches are routed around the perimeter of KHL. The drainage ditches convey surface water that has flowed from the diversion berms and downslope flumes along with surface water from overland flows off the final cover system and from the RCRA drains and drain pipes installed in the cover system to the sedimentation basins located around KHL. Approximate locations of the final cover drains are provided in **Appendix L.6**. Culverts are located around KHL property to convey surface water under roadways and into sedimentation basins.

3.4.3 Sedimentation Basins

Five sedimentation basins are located throughout KHL property. These sedimentation basins collect runoff from KHL prior to discharging through approved WPDES outfall structures. The location of these basins is provided on **Figure 4**.

Per the Storm Water Pollution Prevention Plan for KHL, Sedimentation Basin No. 1 is located along the southwestern boundary of KHL, adjacent to the Former City of Racine Landfill. Discharge from Sedimentation Basin No. 1 is through Outfall 001, and is routed through the South Drainage Ditch and conveyed west to the Pike River.

Sediment Basins No. 4 and 5 were built as part of the Northwest Expansion portion of KHL and are located to the northeast and north of the limits of waste, respectively. Each basin discharges through their respective outfall structure into the Gunderson Drainage ditch which flows to the surrounding street drainage or adjacent water features. The Gunderson Drainage Ditch also receives direct flow from areas northwest of the landfill (i.e., between the property line and the northern perimeter berm of the facility), which assist in limiting run-on onto KHL property.

Sedimentation Basin No. 6 is located south of the Northwest Expansion. Storm water flows into Sedimentation Basin No. 6 and is then discharged from Outfall 006 into the South Drainage ditch. Sedimentation Basin No. 7 is located along the western boundary of Phase 5 of the Northwest Expansion. Sedimentation Basin No. 7 discharges from Outfall 007 located on the north side of the basin.

3.4.4 Long-Term Care Activities

Surface water components such as the diversion berms, drainage ditches and ponds should be inspected for deterioration due to storm events.

Surface water components are to be inspected in accordance with the Inspection Manual (**Appendix I**). Diversion berms, downslope flumes, drainage ditches, culverts, and basins should be inspected for signs of erosion or deterioration. In addition, debris and sedimentation buildup within those components should be observed. Inlets and outlets of downslope flumes, culverts, and the sedimentation basins are to be inspected to confirm that they are clear and allow for unrestricted flow.

Long-term care activities associated with the surface water management components includes general maintenance and repairs as needed. Sedimentation basins are to be cleared of sediment as needed. Sediment and debris located within surface water management components that restrict flow through the system are to be removed as required. Vegetated surfaces are to be mowed or grazed as part of the final cover system maintenance. If erosion or other repairs are noted, they should be resolved as quickly as practicable.

3.5 Environmental Monitoring

Environmental monitoring associated with KHL includes monitoring of the following systems: groundwater, gradient control system (Northwest Expansion only), leachate, leachate head levels, surface water, gas, and surface settlement. Monitoring of these will continue to be conducted during the operational period of KHL. Monitoring infrastructure will be inspected as detailed in the Inspection Manual (**Appendix I**). Maintenance and/or replacement of groundwater monitoring wells will be conducted on an as needed basis. Maintenance of other monitoring infrastructure will be conducted as specified in the applicable sections. The monitoring programs are detailed in the following subsections.

3.5.1 Groundwater Monitoring Program

3.5.1.1 Hydrogeologic Units

Based on their hydrogeologic properties, and for purposes of clarity, the surficial deposits and underlying dolomite bedrock at the site have been divided into four major units (A, B, C, and D). The units are shown schematically on **Figure 10**. Units A and B belong to the Pleistocene Oak

Creek Formation, with the lower Unit C possibly representing part of the Pleistocene Oak Creek Formation and the New Berlin Formation. The bedrock (Unit D) is the Silurian Niagara Dolomite. Each of the units is continuous beneath the site. The site stratigraphy is consistent with regional data. The units are described in detail below. Regional geology in the vicinity of the site is described in the Feasibility and Plan of Operation Reports for the proposed Northwest Expansion (RMT, 1995, 1996a).

3.5.1.1.1 Unconsolidated Deposits

Unit A

Unit A (part of the Pleistocene Oak Creek Formation) extends from the ground surface to depths ranging from 25 to 80 feet and consists predominantly of low-permeability gray clay till (Unified Soil Classification Symbol, CL) with scattered deposits of glaciofluvial or glaciolacustrine silty sand seams (RMT, 1995; Edil, T. and D. Mickelson, 1995). The sand seams are thickest and most continuous to the northwest and southwest of KHL.

The landfill directly overlies the cohesive fine-grained soil (silt and clay) of Unit A. Sand seams in Unit A have reportedly been removed from beneath Corridors 1-6 of the existing site prior to waste placement. However, sand lenses are known to underlie the adjacent former City of Racine Landfill. The vertical hydraulic conductivity of the silt and clay that make up the fine-grained soil in Unit A is approximately 1×10^{-8} cm/s (RMT, 2005a).

Unit B

Unit B, also part of the Oak Creek Formation, ranges in thickness from approximately 35 feet to 69 feet and directly underlies Unit A.

Unit B consists of two relatively continuous glaciofluvial or glaciolacustrine granular deposits (SM, SP, and ML) of varying thickness, separated by a clay till deposit ranging in thickness from approximately 5 feet to more than 30 feet. The uppermost surface of Unit B slopes to the southwest from a high of approximately 650 feet mean sea level (M.S.L.) in the north, to a low of approximately 625 feet M.S.L. in the southwestern corner of the site (RMT, 1996a). Soil borings south of the containment structure indicate that the Unit A-B contact is easily identifiable across the site. The contact surface is essentially flat, marking the base of a glacial advance.

Unit C

Unit C is believed to belong to the Oak Creek Formation that ranges from approximately 25 feet to 50 feet in thickness at depths ranging from approximately 75 feet to 100 feet below the ground surface. This unit consists predominantly of clay (CL), and contacts Unit B at an elevation of approximately 600 feet M.S.L. Based on information from borings 118B, 126D, 154D, 209D, and 202D, Unit C is continuous beneath the site.

As documented in borings 209D and 118B, Unit C includes a basal glaciofluvial sand and gravel deposit that ranges from 6 feet (118B) to 15 feet (209D) in thickness. The sand and gravel deposit is generally well graded and contains boulders greater than 12 inches in diameter. This deposit may belong to the New Berlin Formation.

3.5.1.1.2 Bedrock

Unit D

Based on five on-site borings (118B, 126D, 154D, 202D, and 209D), the Silurian Niagara Dolomite is encountered at depths of approximately 110 feet to 135 feet below ground surface. The dolomite surface appears to be highest north of the site and dips to the south. This interpretation is consistent with the regional bedrock information, which indicates a local bedrock high north of the site.

The Niagara Dolomite is a gray to light-gray, highly fractured, massive dolomite. It contains trace pyrite and calcite crystals, and a few fossils. Iron staining is also present in places. The upper reaches of the formation have Rock Quality Designation (RQD) values ranging from 30 to 100 percent, as calculated from cores taken at borings 126D and 209D, respectively.

3.5.1.2 Groundwater Flow

The water table occurs primarily in the clay of the upper portion of Unit A, except in the northwestern portion of the site (Northwest Expansion area), where it occurs in the Unit A sand. Groundwater in Unit A generally flows from east to west across the site through the clay and sand. Localized variability in this general direction occurs as a result of topographic changes and groundwater/surface water interactions. At the southern perimeter of the site, groundwater flows to the west toward the Pike River. Except for the northwestern portion of the expansion area, the Unit A sand is confined by the Unit A till. Excavation has reportedly removed the Unit A sand beneath most of the existing landfill area. Horizontal gradients in the granular deposit within Unit A along the southern side of the landfill are typically between 0.01 and 0.02 ft/ft and are consistent with regional trends. Gradients along the southern side of the landfill are controlled by the groundwater containment structure, which has proved to be effective at isolating contaminants within the landfill (RMT, 1995 and RMT, 2005a).

A gradient control system (GCS) is present beneath the Northwest Expansion area. Pumping from the gradient control system may induce a slight inward gradient in the Northwest Expansion area. In this interpretation, the base of the gradient control system was assumed coincident with the water table. The impact of the gradient control system is less apparent when the water table is low.

Water table contours are influenced by the presence of the landfill, the containment structure, the groundwater collection trench installed interior to the containment structure, and the Northwest Expansion's gradient control system. Prior to construction of the Northwest Expansion, the groundwater in Unit A probably flowed directly west, following topography. The presence of the landfill has deflected the flow locally to the north and south, around the landfill. South of the landfill, the flow is westward. Along the eastern portion of the landfill, groundwater elevations are generally 13 to 24 feet higher outside the containment structure than they are immediately inside the containment structure, indicating that an inward gradient toward the landfill has developed across the containment structure (RMT, 1996a).

Groundwater in the upper sand of Unit B generally flows from northeast to southwest, with a slight southeasterly component of flow in the southeastern portion of the site. Flow beneath the former City of Racine Landfill and the HWU are to the southwest and south. Historical seasonal

fluctuations in water levels in upper Unit B wells have been approximately 1 to 5 feet (RMT, 2004; 2005a). Groundwater head maps for Unit A and Unit B are included in **Appendix J.2**.

3.5.1.3 Groundwater Monitoring

The current groundwater monitoring program for KHL, including wells, parameters, and sampling frequencies, is detailed in the WDNR Conditional Plan Modification Approval dated August 30, 2017 (**Appendix A.5**) and summarized in **Table 3** and on **Figure 5**. Sampling procedures, equipment, and documentation requirements are detailed in **Appendix H**. The current groundwater monitoring program addresses requirements of chs. NR 507 and NR 664 and will continue during the post-closure period. Laboratory analysis is completed by a laboratory certified by the WDNR. Groundwater elevations are determined for each sampled well based on field depth-to-water measurements collected prior to purging and sampling. All data collected as part of the facility groundwater monitoring program will be maintained in the facility operating record. Additional information regarding the NR 664 groundwater monitoring program is provided in the following subsections.

3.5.1.3.1 NR 664 Compliance Groundwater Monitoring Program

Eight site monitoring wells (CS8, CS10, CS12, CS14, 49LR, UB6, UB8, and UB9) have been designated as NR 664 groundwater monitoring program wells (**Table 3**). These wells are sampled quarterly for routine parameters, including VOCs. These wells are also sampled annually for NR 664 Appendix IX parameters. NR 664 Appendix IX parameters that are detected during each annual event are added to the quarterly sample analysis for the wells with NR 664 Appendix IX detections. Following each quarterly sampling event, detections of NR 664 Appendix IX parameters are compared to NR 664 Maximum Concentrations and NR 140 Enforcement Standards in quarterly reports submitted to the WDNR. NR 664 Maximum Concentrations are summarized in **Table 4**. In accordance with NR 664.0095, the point of standards application is the hydraulically downgradient limit of the waste management area.

NR 664 Appendix IX includes five pesticides that have not been detected at the site (dimethoate, disulfoton, famphur, methyl parathion, and phorate). The eight hazardous waste monitoring wells have been sampled for these five pesticides at least 31 times since 1991. Approximately 30 additional groundwater and leachate monitoring points were sampled for these pesticides at least once between 1991 and 1996. The five pesticides have not been detected in any of these groundwater and leachate samples. Few laboratories maintain Wisconsin laboratory certifications for these pesticides. Recently, finding a laboratory with appropriate certifications has become a challenge, and may not always be possible. Due to the difficulty of finding a laboratory with the appropriate certifications for dimethoate, disulfoton, famphur, methyl parathion, and phorate analysis, and because they have never been detected in groundwater or leachate samples from the site, Republic requests removal of these five pesticides from the KHL groundwater monitoring program.

The HWU at KHL, which consists of Corridors 1 through 6, is situated adjacent to other solid waste management units, including Corridors 7 through 11 and the Former City of Racine Landfill. The vinyl chloride contamination in groundwater south of the containment structure in the vicinity of 141U (i.e., the 141U area) is a known release to groundwater undergoing corrective action. Due to the unlined nature of both the HWU and the Former City of Racine Landfill, both units are likely to have contributed to the release. The current groundwater monitoring program for KHL includes compliance monitoring as described above and monitoring of the 141U area for

corrective action compliance to document continued plume containment. As a result, the current monitoring program is protective of human health and the environment. Based on the foregoing, provisions (a) and (b) of NR 664.0090(6) apply to the KHL groundwater monitoring program. Therefore, Republic requests that the department replace the requirements of NR 664.0091 to 664.0100 with the requirements of the current groundwater monitoring program. A summary of the proposed groundwater monitoring program requirements is provided in **Table 5**.

3.5.1.3.2 Corrective Action Monitoring Program

As outlined in **Section 1.3.3**, KHL installed a groundwater extraction system as a corrective action measure to address vinyl chloride in groundwater in a saturated, confined Unit A sand lens in the 141U area of the site. Four monitoring wells in the 141U area (134U, 141U, 152U, and 153U) are sampled semiannually for VOCs to monitor the corrective action. Quarterly VOC results from three of the NR 664 monitoring wells (CS10, CS12, and CS14) are also used to monitor the corrective action in the 141U area. The laboratory results for correction action monitoring in the 141U area are compared to the NR 140 ESs.

The corrective action in the 141U area is designed to prevent downgradient migration of vinyl chloride in the Unit A sand lens. The corrective action monitoring program demonstrates adequacy of the correction action by documenting through regular sampling of monitoring wells downgradient of the vinyl chloride plume that the vinyl chloride plume is not migrating downgradient. The extent of vinyl chloride in groundwater is limited to four monitoring wells (CS14, 141U, 152U, and 153U). The extent of the vinyl chloride plume in the 141U area based on April 2024 vinyl chloride concentrations is shown on Figure D-1 in **Appendix F.2**. Past vinyl chloride concentrations for wells in the 141U area are shown on trend graphs in **Appendix F.3**.

3.5.2 Gradient Control System Monitoring Program

The gradient control system is associated with the Northwest Expansion of KHL, which is a non-hazardous waste unit. It will be monitored for water quality and discharge volume. The sample locations, parameters, and frequency are included on **Figure 5**.

3.5.3 Leachate Monitoring and Leachate Head Elevations

Leachate quality will be analyzed in accordance with the approved monitoring plan included on **Figure 5**. KHL will maintain a discharge permit with the City of Racine or other appropriate disposal entity to manage leachate, landfill gas condensate, and groundwater extracted from the site during long-term care. A copy of the current discharge permit is included in **Appendix A.2**. The discharge permit will continue to be renewed prior to expiration.

Leachate head elevations will continue to be monitored. Leachate head elevations across the HWU will be evaluated to show compliance based on the criteria specified in **Section 3.2.2**. The leachate head evaluation criteria are not required in the Northwest Expansion and Corridors 7/7A, Corridors 8, 9, 10; and Corridor 11. Therefore, leachate head evaluations in these areas are monitored to confirm that leachate head levels are being maintained at one foot or less above the existing liner system.

3.5.4 Surface Water Monitoring

Monitoring will be performed at the monitoring points according to the frequency and parameters indicated on **Figure 5**.

3.5.5 Gas Monitoring

Landfill gas monitoring will be conducted in accordance with the approved monitoring program during the long-term care period. **Figure 5** summarizes the frequency, parameters, and monitoring locations.

3.5.6 Surface Settlement

Settlement monitoring via survey hubs will not be completed during long-term care period. Settlement will be visually observed as detailed in **Section 3.1.2**.

3.6 Groundwater Collection and Containment

As noted in **Section 2.6**, a groundwater containment and associated collection structure was constructed along the western and southern perimeters of the HWU in KHL. The groundwater containment structure consists of a bentonite slurry wall and a gravel filled groundwater collection trench with perforated corrugated piping to collect and convey groundwater to removal points (manholes and lift stations). As part of the containment structure, a soil-bentonite slurry wall was constructed along the western perimeter of the HWU, located below Corridors 8, 9, and 10 to hydraulically separate the subsurface soil between the HWU and former City of Racine Landfill. A groundwater collection trench was constructed immediately east of the slurry wall (Foth, 1988). The containment structure also extends along the southern and western perimeters of the former City of Racine landfill. Construction of the groundwater containment structure occurred during 1988 and 1989.

The bentonite slurry wall is approximately 4,490 lineal feet and a minimum of 30 inches in width. The slurry wall was keyed into the underlying soil to provide a barrier against off-site migration of groundwater (and or leachate) and landfill gas. In general, the slurry wall depth ranged from 15 to 34 feet with an average depth of 25 feet. The slurry wall was located approximately 15 feet from the groundwater collection trench.

The groundwater trench is designed to work in conjunction with the slurry wall and consists of a minimum 10-inch-wide by a maximum 24-foot-deep trench that is approximately 4,281 lineal feet in length. A perforated pipe is installed within the trench that collects groundwater and transfers it to lift stations along the southern and western boundary of the Old Site.

The associated groundwater collection pipe begins at manhole MH9, located at the southeastern corner of the HWU, and extends to lift stations LS8, LS6, and LS5. Groundwater/leachate that is collected in the collection pipe gravity flows to the lift stations, prior to being pumped from the lift stations into the combined leachate conveyance system at manholes MH13 and MH10. Approximate locations of the containment structure, manholes, and lift stations are detailed on **Figure 4**.

Long-term care activities associated with the groundwater collection and containment system consist of inspections, general repairs, and maintenance as detailed in **Appendix I**. The

manholes and lift stations associated with the collection system are to be inspected monthly during their operation. The groundwater collection lines associated with the containment structure will continue to be jetted annually. Monitoring of the groundwater wells surrounding the containment structure will continue during the long-term care period. Pumps within the lift stations will be replaced on an as needed basis.

3.7 Benchmarks

Four benchmarks (also known as survey control points) are located at KHL. These benchmarks are used to develop surveys with a consistent coordinate system at KHL. The benchmarks are located as identified in **Appendix M**.

The control points are to be protected and maintained to ensure their integrity. The control points are concrete monuments with a utility marker to prevent accidental damage from occurring. The control points will be inspected annually during the sitewide annual inspection for signs of damage. The control points are to be surveyed routinely to ensure their integrity for survey control.

3.8 Site Security

Site security measures are detailed in **Section 4.1**. Reoccurring inspections of the site security measures will be completed as specified in the Inspection Manual (**Appendix I**). During inspections, security measures are to be evaluated to ensure they are in good working order. At a minimum:

- Openings within the security fencing are small enough that animals or humans are not able to enter. If large openings are found, the openings are to be identified and repaired as soon as is practical.
- Confirmation that locking mechanisms on the security gate are functional and can be locked and easily unlocked. Evidence of attempted unauthorized openings of the security gate locks should be noted (i.e., evidence of bolt cutters being used, damage to the locking interface, unexplained denting). If damage to the locking mechanism at the security gate is identified, the locking mechanism should be replaced.

3.9 Corrective Action

Corrective action is ongoing at KHL within the 141U area located to the southeast of KHL limits of waste. The corrective action system consists of 3 recovery wells. Initially three 2-inch recovery wells (R-2, R-3, and R-4) were installed in the Unit A sand in June 1995 and a pilot pumping test was performed. The groundwater extraction system was upgraded and winterized in November and December 1995 with the addition of 6-inch recovery wells R-5, R-6, and R-7 and discharge piping to the leachate collection system which empties into the City of Racine sanitary sewer. Installation of these vertical extraction wells along with the previously installed groundwater containment structure (1988/1989) was identified as the most effective implementable measure to control migration of the vinyl chloride plume and to remediate groundwater in the Unit A sand. These extraction wells have continued to remove groundwater from the area since their implementation in 1996. Recovery well R-6 was ultimately redrilled and replaced by R-6R in June to September 2008. The former recovery well R-6 was abandoned in June 2008. The locations of these recovery wells are included on **Figure 4** and on Sheet 1 in **Appendix F.1**.



The three recovery wells (R-5, R-6R, and R-7) each have a dedicated submersible pump which is used to extract groundwater from the zone of influence around the recovery well. Extracted groundwater is pumped to manhole MH-10 which gets routed through the leachate conveyance system to the City of Racine Sanitary Sewer. **Appendix F.4** provides an excerpt from the Annual Report (Figure D-2) which details the instrumentation diagram for the remedial system consisting of the three recovery wells. Information pertaining to the monitoring history and general history of the corrective action measures is provided in **Section 7.2**.

Throughout long-term care, inspections relating to the extraction system are to continue as detailed in the Inspection Manual (**Appendix I**). Ineffective or damaged parts and components are to be replaced on an as-needed basis to maintain the operation of the extraction system. In addition, the submersible pumps within the extraction wells are removed annually and be treated to eliminate iron-fouling bacteria. This minimizes build-up in the extraction wells, allowing the extraction wells to operate efficiently.

The wells within the 141U area include monitoring points CS10, CS12, CS14, 134U, 141U, 152U, and 153U, which are regularly sampled per the monitoring program. Wells CS10, CS12, and CS14 are sampled quarterly for VOCs and multiple other parameters. Whereas wells 134U, 141U, 152U, and 153U are sampled on a semiannual basis for multiple parameters including VOCs. Sampling of these wells will continue to verify the effectiveness of corrective action measures.

4.0 Other Applicable NR 664 Requirements

4.1 s. NR 664.0014 - Security Procedures and Equipment

In accordance with s. NR 664.0014, the owner or operator shall prevent the unknowing entry and minimize the possibility for the unauthorized entry, of persons or livestock onto the active portion of the facility. As previously noted, KHL is currently closed with final cover placed; therefore, no active areas are located at KHL. Signage indicating the entrance of the landfill is posted at the site entrance to notify persons entering the facility. Unauthorized access is restricted at KHL by security fencing and other physical barriers, which are located along the perimeter of KHL. Security gates prohibit access to KHL, which remain locked during non-operating hours. During operating hours, an on-site Environmental Supervisor oversees the property. This fencing and the security gates will be maintained in good working order throughout the long-term care period.

In addition to the site security measures, monitoring features and monitoring equipment are locked when not being utilized to prevent unauthorized use or access to the features and equipment.

4.2 s. NR 670.014(h)(4) - Equipment Failures

In accordance with s. NR 670.014(h)(4), procedures, structures, or equipment used to mitigate the effects of equipment failure and power outages are required to be accounted for at the landfill. Power outages encountered at KHL are unlikely to negatively impact the equipment at the landfill. The equipment and systems at KHL rely on the local utility network as no backup generators are used on site. The reliance on the local utility network provides a more reliable power source which is less likely to encounter widespread power outages. When power outages do occur, the local utility is incentivized to restoring power in a timely fashion and has the personnel available to complete this task at any point during the year.

Even in the case of power outages, the impacts at KHL are minimal. The existing monitoring system does not use any Supervisory Control and Data Acquisition (SCADA) systems; therefore, if power outages occur no changes or issues would occur with the existing monitoring system equipment.

To mitigate the effects of equipment failure, regular inspections will continue to take place to evaluate the condition of equipment. If equipment failures or deterioration are noted, the equipment would be repaired or replaced depending on its operational state. Replacement pumps are maintained at the facility to minimize the impact of equipment failures on the leachate and groundwater removal activities.

4.3 s. NR 664.0015 - Inspection Program

The Inspection Manual for KHL is provided in **Appendix I**. Inspections of the long-term care components are detailed in the Inspection Manual and in their applicable subsections in **Section 3.0**.

Inspections will be recorded and maintained at KHL and repairs and remedies for specific maintenance requirements will be noted. An example of the inspection forms for KHL are provided in **Appendix I**.

4.4 s. NR 664.0016 - Personnel Training Program

KHL conducts training for employees who have hazardous waste management job responsibilities or could be exposed to hazardous waste. This training is generally consistent with the training requirements required for long-term care of closed landfills in Wisconsin. The training program assists in ensuring that maintenance and operations are completed and that the required documents are preserved.

The training program and associated records are provided in the Hazardous Waste Training Program in **Appendix N**. This document describes the necessary training for proper contingency plan implementation, and necessary training for performing inspections and repairs. Additionally, the Hazardous Waste Training Program provides awareness training such that key facility components are not inadvertently damaged by personnel doing work at the facility. Onsite personnel receive this training as needed. Copies of personnel certifications will also be maintained in the site office.

4.5 Ch. NR 664 - Contingency Plan

A Contingency Plan has been prepared for KHL to address risks to human health and the environment from hazardous waste contained in Corridors 1 through 6 at KHL. This document includes information pertaining to the facility layout, evacuation plan, emergency response procedures, shut-down, emergency equipment, and spill prevention plans. The most recent Hazardous Waste Unit Contingency Plan is included in **Appendix O**.

4.6 Miscellaneous Requirements

4.6.1 s. NR 670.014(h)(5) - Personnel Protection

Personnel protection is a primary objective at KHL. Personnel interacting with the landfill must complete the training program as detailed in **Section 4.4** and have a key understanding of emergency response and procedures at KHL noted in the Contingency Plan (**Section 4.5**).

The use of personal protective equipment (PPE) is to be used when working within the landfill area; however, the type of equipment will vary based on task being completed. During construction and repair related events, PPE such as high-visibility vests, hard hats, hearing protection, steel toe boots, and appropriate clothing (gloves, long sleeves and long pants) are required. When sampling, environmental PPE, such as nitrile gloves, appropriate clothing, and high-visibility vests, should be used. First aid kits, two-way radios, fire extinguishers, and telephones are made available. Radio communications are available to personnel who may be required to work in the HWU area.

Disturbance activities by landfill personnel within the HWU is limited to maintenance activities. Work that would require excavation through the cover system or exposure of waste will be performed by outside contractors that have experience in the type of work. These contractors are required to maintain and comply with a Health and Safety Plan and be familiar with the Contingency Plan for KHL.

4.6.2 s. NR 670.014(h)(6) - Atmosphere releases prevented

In accordance with s. NR 670.014(h)(6), procedures, structures, or equipment used to prevent releases to the atmosphere are required to be accounted for. Prevention of atmospheric releases are primarily accomplished through the continued operation of the landfill gas extraction and collection system. This system is summarized in **Section 2.3.2** and will be inspected, monitored, and maintained as detailed in **Section 3.3**.

4.7 s. NR 664.0197 - Long-Term Plan for Tank Systems

WDNR previously identified two potential tank systems, gas condensate system and landfill liquid conveyance system, within the December 2019 Notice of Non-Compliance. However, it was determined in the September 2020 Notice of Non-Compliance Addendum letter that the tank system requirements did not apply to these systems (**Appendix A.8**). Therefore, long-term plan requirements for the tank system do not apply to facilities at KHL.

4.8 s. NR 664.0073 - Operating Record

An Operating Record is maintained at KHL to provide a centralized and standardized location for the following records: contingency plan incident records, inspection records, long-term care cost estimates, and training records. The Operating Record is updated annually and will continue to be updated during the long-term care period.

4.9 s. NR 664.0075 - Annual Reporting

KHL submits a Hazardous Waste Annual report to the WDNR by March 1 each year, which will continue throughout the long-term care period. This Hazardous Waste Annual report includes the required information in s. NR 664.0075. The authorized representative of the owner/operator will certify the Hazardous Waste Annual Report.

In addition to the Hazardous Waste Annual Report, an Annual Report for KHL is also completed annually. This report is required to be submitted before June 15th each year and details the general monitoring and maintenance activities completed at the landfill. KHL will continue to submit this Annual Report during the long-term care period.

4.10 s. NR 664.0119(1) - Compliance Documentation

Documentation of long-term care notices and deed notice is provided in **Appendix P**.

5.0 Long-Term Care Cost Estimate

Cost estimates have been developed for the operation, maintenance, and monitoring activities anticipated for the long-term care period for KHL. The 2025 revision is provided in **Appendix Q.1**.

Long-term care costs have been grouped into four general categories. Three of these categories deal with maintenance of the final cover system, leachate system, and gas extraction system. The final category is related to environmental monitoring and miscellaneous items which covers maintenance of monitoring features along with the associated monitoring and reporting. The costs, quantities, and unit totals associated with each task and subtask are displayed with references for the basis of each price point. The tasks and totals account for costs to procure, manage, and administer the third-party work, as well as a 10% minimum contingency for unforeseen activities.

Cost associated with corrective action are managed under separate funding and are not included in the long-term care estimate. The corrective action estimates was included in the August 23, 2024 *Conditional Plan of Operation Approval Modification for Adjusting Owner Financial Responsibility for the Kestrel Hawk Landfill* (**Appendix A.9**). The 2025 revision is provided in **Appendix Q.2**.

Republic understands that modifications to operation, maintenance, and monitoring activities are likely to occur throughout the long-term care period. Appropriate adjustments to the long-term care cost estimates will be made as modifications are approved and implemented.

The cost estimate extends to the end of the minimum 40-year financial assurance period.



6.0 Long Term Care Financial Assurance

Financial assurance instruments satisfying the requirements of NR 500 and NR 600 are provided to the WDNR by Republic to ensure adequate funds are available to complete the specified operation, maintenance, and monitoring activities throughout the long-term care period. Annual adjustments will be made to these financial instruments to reflect completion of each year's activities and to adjust future annual amounts for inflation.

Bonds for long-term care and corrective action have recently been issued by Republic's financial institution and are held to demonstrate that funds would be available to pay for required post-closure care activities. The most recent long-term care cost bonding is provided in **Appendix Q.3**.

7.0 Solid Waste Management Units and Corrective Action

WDNR guidance documentation requires that all solid waste management units (SWMUs) at KHL be identified and described. The following section provides or references within this report the required information in accordance with s. NR 670.014(4)(a)-(c).

7.1 Solid Waste Management Units

Two primary units are located at KHL. These are the Old Site and the Northwest Expansion. The general history of both these units is provided in **Section 1.3.1**.

The Old Site is comprised of several solid waste management units: the former City of Racine Landfill, the Hazardous Waste Unit (Corridors 1 through 6), along with municipal solid waste units (Corridors 7, 7A, and 8 through 11). The former City of Racine Landfill is approximately 10 acres in size and was the first area to begin accepting waste in the early 1960s. The waste accepted primarily consisted of foundry and municipal waste. There is minimal information as to the design features, waste placement procedures, and construction for this portion of KHL. However, clay barrier walls separate the former City of Racine Landfill from Corridors 8 through 10 to the east and Corridor 11 to the north. Construction began in the remaining areas of the Old Site starting with Corridor 1 in 1970. A summary of the available information pertaining to the Old Site's design is provided **Appendix J.1** and **Section 3.2.1**. Areas of the Old Site were closed over the course of several years, these closure areas (including those for the Northwest Expansion) are identified on **Figure 6**.

In addition to the solid waste management units that comprise the Old Site, there is also the Northwest Expansion solid waste management unit. The Northwest Expansion was approved for construction in August 1996 (**Appendix A.10**) by the WDNR and consists of 5 landfill phases. A portion of the Northwest Expansion overlays the Old Site. The Northwest Expansion was approved to accept non-hazardous municipal, commercial, and industrial solid wastes and has operated from 1996 through 2022. Design drawings associated with the Northwest Expansion were provided to the WDNR as part of the May 1996 Plan of Operation prepared by RMT, Inc (RMT, 1996b). The Northwest Expansion was designed with a composite liner system, leachate collection system, gas extraction system, final cover system, and stormwater management infrastructure, which are summarized in the Plan of Operation Approval Letter from the WDNR provided in **Appendix A.10**. In December 2022 landfilling activities at KHL ceased and construction of the remaining cover areas was completed in 2024. These cover areas are also depicted on **Figure 6**.

7.2 Corrective Action

As summarized in **Section 1.3.3**, corrective action is ongoing at KHL within the 141U area due to exceedances of vinyl chloride from historical waste management activities. The corrective action system was designed to achieve the following objectives (1) control the source of vinyl chloride release, (2) to contain the migration of the vinyl chloride contaminant plume, and (3) to restore the site, as necessary, to protect human health and the environment by attaining ch. NR 140 cleanup standards.

This subsection provides a summary of monitoring-related information that was developed previously and led to the need to enter corrective action along with the corrective actions taken to date and future corrective actions planned in accordance with s. NR 670.014(4)(c).

The following information is summarized from the December 1996 Corrective Measures Study and Corrective Measures Implementation Workplan, prepared by RMT, Inc (RMT, 1996c). Excerpts from the December 1996 Corrective Measures Study and Corrective Measures Implementation Workplan are included in **Appendix F.5** and **Appendix F.6**. A list of documents was prepared for the 141U area prior to the December 1996 workplan is provided in **Appendix F.5**. These documents can be referenced for additional detail pertaining to the previously conducted investigation.

In December 1991, the Land Reclamation Company of Racine, Wisconsin (LRC) (former owner of KHL) entered into an Administrative Order of Consent (Consent Order) with the USEPA and WDNR for vinyl chloride exceedances south of the landfill, near well 141U. This Consent Order required that LRC perform a RCRA Facility Investigation to determine the nature and extent of impacts from the facility, perform a corrective measure study to identify and evaluate remedial alternatives, and implement the corrective measure selected by USEPA. These investigations began in August 1993 with Law Engineering and Environmental Services, Inc., conducting three phases of investigation in 1993 and 1994. During this investigation, a plume of vinyl chloride was identified in the groundwater in Unit A sand, located approximately 40 feet below the ground surface, in the area of well 141U south of the landfill. **Appendix F.6** provides a summary of vinyl chloride concentrations from the wells in the 141U area during this investigation period (March 1990 to July 1996) along with the analytical data.

The Unit A sand is part of the Pleistocene Oak Creek Formation which extends from the ground surface to depths ranging from 25 to 80 feet and consists predominantly of low-permeability gray clay till (Unified Soil Classification Symbol, CL) with scattered deposits of glaciofluvial or glaciolacustrine silty sand seams. The sand seams are thickest and most continuous to the northwest and southwest of KHL. The landfill directly overlies the cohesive fine-grained soil (silt and clay) of Unit A. Sand seams in Unit A were removed from beneath Corridors 1-6 of the existing site prior to waste placement. However, sand lenses are known to underlie the adjacent former City of Racine Landfill. Within the Well 141U area, the Unit A sand ranges in thickness from 1 to 6 feet with depth of water ranging from 12 to 29 feet below the ground surface, depending on season and sampling point.

Following USEPA and WDNR approval, RMT installed three 2-inch recovery wells (R-2, R-3, and R-4) in the Unit A sand in June 1995 and performed a pilot pumping test. The groundwater extraction system was upgraded and winterized in November and December 1995 with 6-inch recovery wells R-5, R-6, and R-7 and discharge piping to the leachate collection system which empties into the City of Racine sanitary sewer. Installation of these vertical extraction wells was identified as the most effective implementable measure to control migration of the vinyl chloride plume and to remediate groundwater in the Unit A sand. These extraction wells have continued to remove groundwater from the area since their implementation in 1996.

To determine if cleanup standards have been met, groundwater monitoring is completed in the area. Cleanup standards require that the wells meet existing ch. NR 140 standards by lowering the vinyl chloride concentrations to the current Preventative Action Limit (PAL) concentrations. The wells are sampled semi-annually and evaluated for multiple parameters, including volatile organic compound (VOC) concentrations, in conformance with the approved 2017 environmental monitoring plan.

Since the installation of well 141U in April 1988, vinyl chloride has been detected in groundwater samples collected from the well at concentrations consistently above the NR 140 enforcement

standard (ES) value (0.2 µg/L). Monitoring well 141U is located approximately 200 feet south of the HWU and is screened in the Unit A sand. In 1988, five additional Unit A wells (147U, 148U, 149U, 150U, and 151U) were installed within a 500-foot radius of 141U to further investigate vinyl chloride migration. Except for one low-level vinyl chloride detect in 150U in March 1991, vinyl chloride and other VOCs were not detected in these wells, which were abandoned in October 1991 because of construction activities in the area.

It was determined that the source of this impact was likely due to landfill gas that escaped into the partially dewatered Unit A sand early in the site development, before the groundwater containment structure was in place. The lack of corresponding increases in inorganic concentrations, concurrent with the vinyl chloride increase at the 141U area wells, supports this conclusion. Vinyl chloride levels in the groundwater at well 141U declined sharply after 1991, from a high of 170 µg/L (March 1991) to a low of 3.0 µg/L (October 2002). Vinyl chloride concentrations increased from 2002 through 2014 due to increased maintenance conducted on the system to address fouling of the pumps with iron bacteria.

As a result of repairs and the annual treatment to remove iron bacteria, vinyl chloride concentrations at 141U have been reduced since 2014 to near-historical lows. Trends of the vinyl chloride monitoring for wells within the 141U area are provided in **Appendix F.3**, these trends were provided in the 2023 Annual Report, prepared by TRC, dated June 2024.

The system has demonstrated its effectiveness in containing the vinyl chloride impacts in the Unit A sand, as evidenced by non-detects at downgradient monitoring wells in the most recent year (2023). The long-term declines in vinyl chloride concentrations in wells 141U and CS14 are likely due to the migration of unimpacted groundwater through the impacted area, the presence of the groundwater containment structure, the groundwater extraction system, and to the natural attenuation of the vinyl chloride. This corrective action effort is evaluated and detailed in the Annual Reports submitted by KHL.

The extraction wells will continue to operate during the long-term care period to continue to manage the vinyl chloride plume until it is deemed unnecessary by the WDNR. Associated groundwater monitoring within the 141U area will also continue to verify the effectiveness of the implemented corrective action measures until the remedial goal has been achieved. No other corrective action activities, other than the continued operation of the existing extraction well system, are planned.

8.0 Other Hazardous Waste Requirements

As part of the WDNR guidance document, this section is to memorialize hazardous waste compliance details. WDNR requested that this FPOR include information assembled by KHL as part of the hazardous waste compliance assessment that concluded with the WDNR's June 4, 2021 Conditional Close-Out letter (**Appendix A.11**), such as generator waste determinations, documentation regarding gas processing residual including condensate, and WWTU exemption support. Documents associated with this memorialization of these items are provided in **Appendix R**, unless otherwise specified.

The hazardous waste compliance assessment for KHL was originally initiated through the issuance of a Notice of Noncompliance (NON) on December 9, 2019, from the WDNR (**Appendix A.12**), with an addendum that was issued on September 16, 2020 (**Appendix A.8**). Within these documents, 21 alleged areas of non-compliance were identified. KHL addressed these items in a series of meetings, three letters, and several reports included with the letters which provided additional information in response to the NON and addendum items that the WDNR deemed satisfactory and sufficient to resolve the issues.

As noted above, the primary items that are requested to be memorialized in this section include generator waste determinations, documentation regarding gas processing residuals, including condensate, and WWTU exemption support. Documentation related to these items are provided as follows:

- Generator waste determinations: Per the close out letter, the submitted response dated November 16, 2020, provided as the additional information related to waste determinations. This response letter is provided in **Appendix R.1**.
- Documentation regarding gas processing residuals, including condensate: Per the close out letter, the submitted responses dated November 16, 2020, and April 7, 2021, provided the additional information pertaining to the gas processing residuals, including condensate. The November 2020 submittal is provided in **Appendix R.1**. The applicable excerpts of the subsequent April 2021 submittal is provided in **Appendix R.2**. A memorandum prepared by KHL's legal advisors regarding characterization of leachate gas condensate is included in the Hazardous Waste Generation Report included in **Appendix R.2**, this documentation was initially provided in March 2020. It should be noted that in the Close-out letter, a new area of concern was added as Item 22, regarding the regulatory status of condensate from landfill gas processing. This issue required classification from the US EPA, but no further actions from KHL. If the response from the EPA contradicted KHL's position, the department reserved the right to revisit this issue.
- WWTU exemption support: The WWTU exemption was initially introduced in NON item 16 "Tank System Requirements" within the December NON letter from WDNR. By the Addendum NON letter from WDNR, it was noted that this NON item had been resolved. Additional information relating to NON item 16 was provided to the WDNR on April 14, 2020, which is provided in **Appendix R.3**. This documentation indicated the following:
 - The condensate was not considered a hazardous waste, therefore the hazardous waste storage requirements, transportation, tank system, and generator requirements were not applicable.

- The leachate and groundwater are covered by the domestic sewage exclusion per a memorandum prepared by KHL's legal advisors and therefore not subject to the requirements of NR 664 and 670.

It was subsequently determined by WDNR that the requirements and subsequent exclusions related to the tank system requirements did not apply.

These remaining actions include the implementation by KHL of revised procedures that demonstrate compliance with hazardous waste requirements in NR 600 through 679. The department indicated no further action was required for previously identified areas of concern and alleged areas of non-compliance.

9.0 References

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- Law Engineering and Environmental Services, Inc. (LAW). 1996. Draft RCRA Facility Investigation Report. Prepared for Land Reclamation Company, February 2, 1996. Supplement: LRC/Sanifill Response to Comments (April 3, 1996), dated September 26, 1996.
- RMT, Inc. (RMT). 1995. Feasibility Report for Proposed Northwest Expansion – Addendum 2, Land Reclamation Company. June 1995.
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- RMT. 2005b. Plan Modification Request for Old Site Leachate Extraction System: Kestrel Hawk Recycling and Disposal Facility, Racine, Wisconsin (License No. 00572). October 10, 2005.
- TRC. 2020. Hazardous Waste Generation Report. June 12, 2020.
- TRC. 2024. 2023 Annual Report – Kestrel Hawk Landfill. June 2024.
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- Warzyn, Inc. 1994. Construction Observation Report: RCRA Phase II Final Cover – Land Reclamation Company Landfill, City of Racine, Racine County, Wisconsin (WDNR License No. 572). December 1994.
- Warzyn, Inc. 1995. Construction Observation Report: Corridor 7 North Slope Final Cover – Land Reclamation Company Landfill, City of Racine, Racine County, Wisconsin (WDNR License No. 572). February 1995.
- WDNR. 2004. Remaining Old Site Final Cover: Use of LLDPE Geomembrane, Closure Schedule for the Remaining RCRA and non-RCRA Final Cover for the “Old Site”, Extension of RCRA Cap to West Edge of Corridors 8, 9, & 10 Baseline (RCRA Phase 3 Final Cover) and Northwest Expansion Final Cover Closure Cost to include remaining RCRA and non-RCRA Final Cover of the “Old Site” – Plan Modification Approval for the Kestrel Hawk Landfill, Lic. # 0572. July 2. Letter.
- WDNR. 2005. Kestrel Hawk Landfill (Lic. #: 0572) – Hazardous Waste Site Leachate Head Level Plan Modification Request and Conditions 1(a), (b), and (c) of the December 15, 2004 Stipulation and Order for Judgement. December 28, 2005.
- Weaver Consultants Group. 2024. Construction Documentation Report 2023-2024 Composite Cover. July 24, 2024.

**Table 1: 2014 - 2024 Annual Hazardous Report Summary
Kestrel Hawk Landfill
Racine, Wisconsin**

Values From Annual Hazardous Waste Reports⁽¹⁾			
Year	Annual Hazardous Waste Report Quantities (lbs)	Net Waste (Generated minus Exemptions) (lbs)	Excluded Waste Transported to WWTP (lbs)
2014	9,112,329	392	9,111,937
2015	5,770,691		5,770,691
2016	14,827,720	70	14,827,650
2017	34,490,282		34,490,282
2018	841,030		841,030
2019	2,074,183		2,074,183
2020	89,175,529	3,343	89,172,186
2021	69,834,124	5,187	69,828,937
2022	74,643,968	95	74,643,873
2023	77,794,085	1,676	77,792,409
2024	74,846,217	461	74,845,756

Footnotes:

⁽¹⁾ Values summarize the previous annual hazardous waste reports submitted by KHL.

Created by: B. Kahnk 3/26/2025

Checked by: T. Martin 3/27/2025

**Table 2: List of Available Permits, Licenses, and Construction Approvals
Kestrel Hawk Landfill - Hazardous Waste Unit
Racine, Wisconsin**

Date	Subject
April 15, 1970	Landfill Approval Letter
May 16, 1975	Hazardous Waste Acceptance Approval
May 17, 1975	Landfill License Application, License #0572
August 2, 1976	Hazardous Waste Acceptance Approval
March 31, 1981	Review of Documentation of Corridor 5 Construction and Conditional Approval, Land
May 12, 1981	Review of Hazardous Waste Plan and Amendments for Land Reclamation Ltd., License #572
November 20, 1981	Corridor 5 Approval Modifications, Land Reclamation, Ltd., License #572
January 8, 1982	Determination of NR 180 Feasibility for the Land Reclamation, Ltd Solid Waste Disposal Site, License #572, Racine County
December 10, 1982	"Interim License Denial", Land Reclamation Ltd. Landfill
February 9, 1983	Clay Cutoff Wall Documentation, Land Reclamation Ltd. Sanitary Landfill, License No. 572, Racine County
October 30, 1984	Corridor 6 Construction Approval, Land Reclamation Ltd. Landfill, License No. 572
December 19, 1984	Plan of Operation Approval, Land Reclamation, Ltd. Landfill, License #572
November 4, 1985	Plan Modification Approval, Interim Sanitary Sewer Connection, Land Reclamation Ltd., License #572, Racine County
November 19, 1985	Site Construction Documentation Approval, Corridor 6, Land Reclamation, Ltd. Landfill, License #572, Racine County
April 11, 1986	Leachate Collection Line Plan Modification Review, Land Reclamation Landfill License #0572, Racine County
May 2, 1986	Comments on Corridor 6 Construction Documentation Approval, Land Reclamation, Ltd. Landfill, License #572, Racine County
June 15, 1987	Facility Construction Documentation Review, Corridor 7 - Land Reclamation Ltd., License #0572, Racine County
February 1, 1988	Approval of Phase II of North Barrier Wall Construction (Verbal Approval)
June 28, 1988	Sedimentation Basin No. 1, Land Reclamation, Ltd, Landfill, #0572 Racine County
May 1, 1989	Solid Waste Facility Operation License No 11193, EPA ID No. WID980784179
November 17, 1989	Construction Documentation Approval for Corridor No. 7 - Land Reclamation, Ltd., License No. 0572, Racine County, WI
November 17, 1989	Construction Documentation Approval for the Hazardous Waste Unit North Barrier Wall and the East and North Sidewalls of Corridor No. 7 - Land Reclamation, Ltd., License No. 0572, Racine County, WI
June 6, 1990	Facility Construction Documentation Approval, East Half of the North Face of Corridor 7, and Plan Modification Approval to Accept Petroleum Contaminated Soils, Land Reclamation Landfill, #0572, Racine County, WI
October 26, 1990	Facility Construction Documentation Approval, East Half of the North Face of Corridor 7-Phase IB, and Southern Clay Liner Sidewall-Corridor 11, Land Reclamation Landfill, #0572, Racine County, WI
January 11, 1991	Facility Construction Documentation Approval, West Half of the North Face of Corridor 7, Land Reclamation Landfill, #0572, Racine County, WI
July 29, 1991	Facility Post-Construction Documentation Approval, East Slope Final Clay Cover, Land Reclamation Landfill, #0572, Racine County, WI
May 11, 1992	Interior Manhole Construction Documentation Approval
February 22, 1993	Construction Documentation Approval for Corridor 11-Phase 2, Land Reclamation Company Landfill, License #0572, WID 076171008

**Table 2: List of Available Permits, Licenses, and Construction Approvals
Kestrel Hawk Landfill - Hazardous Waste Unit
Racine, Wisconsin**

Date	Subject
April 13, 1993	RCRA Cover - Phase I, Construction Documentation Approval, Land Reclamation Company Landfill, Racine County
July 7, 1993	Gas and Leachate Extraction System Construction Documentation Approval, Land Reclamation Company Landfill, Racine County
July 28, 1993	Construction Documentation Approval for the Completion of Corridor 11, Land Reclamation Company Landfill, Racine County
September 13, 1993	Groundwater Containment Structure Construction Documentation Approval, Land Reclamation Company Landfill, Racine County
November 4, 1993	Construction Documentation Approval for Phase II of West Barrier Wall and Horizontal Gas Well Construction and Plan of Operation Modification, Land Reclamation Company Landfill, Racine County
March 14, 1994	Construction Documentation Approval for Phase IV & V of the North Barrier Wall, Land Reclamation Company Landfill, Racine County
April 19, 1994	Construction Documentation Approval, East Slope Final Clay Cover, Land Reclamation Landfill #0572, Racine County, WI
July 13, 1994	Construction Documentation Approval, East Slope and Corridor 7 Gas & Leachate Extraction System, Land Reclamation Company Landfill, #0572, Racine County, WI
August 19, 1994	Host Agreement between Land Reclamation Company and the City of Racine, Wisconsin.
November 2, 1994	Construction Documentation Approval, Corridor 7, North Slope Final Cover and Completion of Corridor 7, East Slope Final Cover, Land Reclamation Landfill, #0572, Racine County, WI
May 22, 1996	Construction Documentation Approval for the South Slope of the Hazardous Waste Unit, Land Reclamation Company Landfill, Racine County
August 1, 1996	Construction Documentation Approval for the Barrier Wall of the Hazardous Waste Unit, Land Reclamation Company Landfill, Racine County
August 30, 1996	Plan of Operation Approval for the Northwest Expansion of the Land Reclamation Company Landfill
September 8, 2004	Construction Documentation Determination for 2001 Old Site Final Cover Closure, Kestrel Hawk Recycling and Disposal Facility (RDF), License #0572
May 24, 2010	Construction Documentation Determination for the Phase 2 and Partial Closure and RCRA Cover Extensions, Kestrel Hawk Recycling and Disposal Facility (RDF), License #0572
January 1, 2017	Industrial Wastewater Discharge Permit #1007L
October 1, 2020	Solid Waste Facility Operation License - Solid Waste Processing - Solidification as Part of Landfill Operation (#3089)
October 1, 2020	Solid Waste Facility Operation License - Solid Waste Processing - Soil Remediation as Part of Landfill Operations (#3872)
January 1, 2021	Renewal of the Local Limits Pretreatment Discharge Permit
May 14, 2021	General Permit to Discharge Under the Wisconsin Pollutant Discharge Elimination System WPDES Permit No. WI-S067857-5
March 8, 2022	Air Pollution Control Operation Permit (#25207699A-P30)
October 1, 2022	Solid Waste Facility Operation License (License #572)
November 8, 2024	Construction Documentation Approval for 2023-2024 Composite Cover Construction for the Kestrel Hawk Landfill, License #0572
December 16, 2024	Renewal of the Local Limits Pretreatment Discharge Permit

**Table 3: Groundwater Monitoring Program Summary
Kestrel Hawk Landfill
Racine, Wisconsin**

Unit	Wells	Parameters	Frequency
NR664			
A	CS8, CS10, CS12, CS14	VOCs alkalinity, sodium, chloride, hardness, fluoride, field pH, field specific conductance, field temperature, elevation, NR 664 Appendix IX detects from annual monitoring	Quarterly
B	49LR, UB6, UB8, UB9	VOCs alkalinity, sodium, chloride, hardness, fluoride, field pH, field specific conductance, field temperature, elevation, NR 664 Appendix IX detects from annual monitoring	Quarterly
A & B	CS8, CS10, CS12, CS14 49LR, UB6, UB8, UB9	NR 664 Appendix IX Parameters	Annual
NR500			
A and B	134U, 141U, 152U, 153U, 204URR, 208U, 209U	VOCs	Semiannually
A	7U, 40U, 47TR, 109TRR, 201T, 202T, 204TR, 208T, 209T, CS2, CS6R	VOCs	Annual
B	109L, 201U, UB2, UB4, UB5, UB7	VOCs	Annual
A, B, and D	5TR, 5UR, 5LRR, 6TR, 6U, 6L, 7T, 17TR, 17UR, 17LR, 46TR, 46U, 47U, 48TR, 48UR, 48LR, 49T, 49U, 108T, 108U, 108L, 109U, 120T, 120U, 120L, 126T, 126U, 126L, 126D, 134T, 141T, 146UR, 202U, 202D, 209D, 210U, 211U, CS1, CS3, CS4, CS5, UB1	Groundwater elevation	Semiannually
A	7U, 40U, 47TR, 109TRR, 134U, 141U, 152U, 153U, 201T, 202T, 204TR, 208T, 209T, CS2, CS6R	Groundwater elevation, field temperature, field conductivity, field pH, alkalinity, hardness, chloride, fluoride, sodium	Semiannually
B	109L, 201U, 204URR, 208U, 209U, UB2, UB4, UB5, UB7	Groundwater elevation, field temperature, field conductivity, field pH, alkalinity, hardness, chloride, fluoride, sodium	Semiannually
Non-NR140 Compliance Wells			
A	CS7, CS9, CS11, CS13	Specific conductance, elevation	Quarterly
A	CS9, CS13	VOCs	Annual

Note:

Program based on December 28, 2005, WDNR Plan Modification approval as modified by the November 3, 2009, and August 30, 2017, WDNR Plan Modification approvals.

Checked by: CLS, 1/15/2007; TEK, 12/16/2009; TEK, 6/12/2012; JNH, 4/2/2015; JNH 12/8/2016; JNH 6/27/2017, AAS 09/15/2017, SS 06/21/2023

**Table 4: NR 664 Maximum Concentration Limits
Kestrel Hawk Landfill
Racine, Wisconsin**

Parameter	NR 140 ES (µg/L)	NR 664, Table 1 (µg/L)
Inorganics⁽¹⁾		
Antimony, dissolved	6	None
Arsenic	10	50
Barium	2,000	1,000
Beryllium, dissolved	4	None
Cadmium	5	10
Chromium, dissolved	100	50
Cobalt	40	None
Copper, dissolved	1,300	None
Cyanide, total	200	None
Lead, dissolved	15	50
Mercury	2	2
Nickel	100	None
Selenium	50	10
Silver	10	50
Sulfide, total	None	None
Thallium, dissolved	2	None
Tin, dissolved	None	None
Vanadium, dissolved	30	None
Zinc	5,000	None
Organics		
Acetophenone	None	None
Carbon disulfide	1,000	None
Chloroethane	400	None
Chloroform	6	None
4,4-DDT	None	None
Dichlorodifluoromethane	1,000	None
1,1-Dichloroethane	850	None
Heptachlor	0.4	None
Methylene chloride	5	None
Phenol	2,000	None
Toluene	800	None
Vinyl chloride	0.2	None

Notes:

⁽¹⁾ Filtered samples.

Bold and italic font indicates the maximum concentration limit that shall be met.

Checked By: JNH, 9/24/2014, AAS 09/15/2017

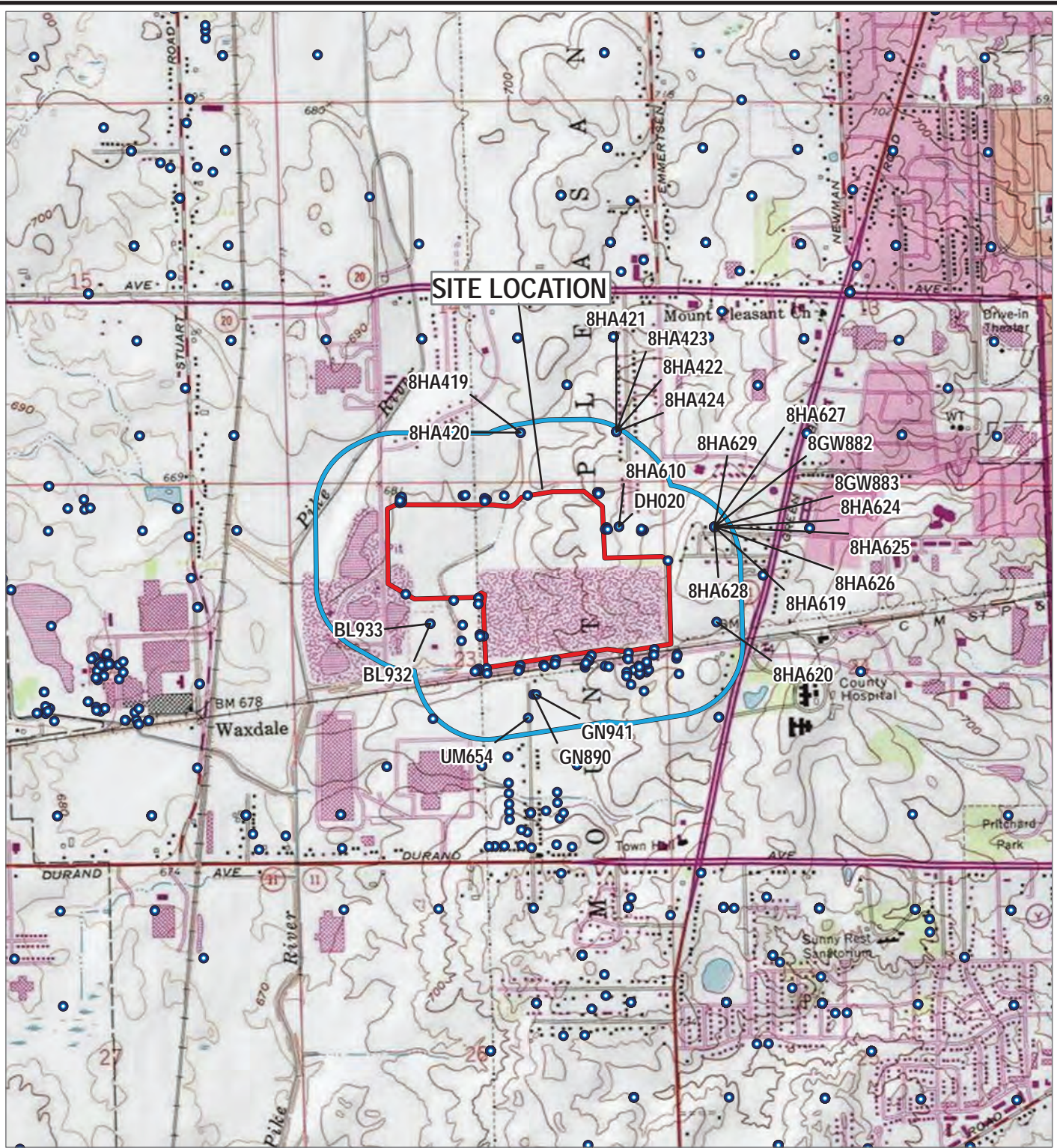
Table 5: Proposed Groundwater Monitoring Requirements
Kestrel Hawk Landfill - Hazardous Waste Unit
Racine, Wisconsin

NR 664.0091 through NR 664.0100 Requirements	Proposed Replacement Requirements
NR 664.0091(1)(a) Compliance monitoring	The current monitoring program includes compliance monitoring
NR 664.0091(1)(b) Corrective action - Groundwater Protection Standard	The current monitoring program includes corrective action monitoring
NR 664.0091(1)(c) Corrective action - Concentration Limits	The current monitoring program includes corrective action monitoring
NR 664.0091(1)(d) Detection monitoring	Not applicable, current program includes compliance and corrective action monitoring
NR 664.0091(1)(e) Certified lab use	No change required
NR 664.0091(2) Department shall specify program elements in license	Department to specify
NR 664.0092 Department shall specify the groundwater protection standard	Groundwater protection standard based on the current compliance monitoring (wells, parameters, concentration limits, etc.)
NR 664.0093 Hazardous constituents	Substances detected from annual sampling for NR 664 Appendix IX parameters
NR 664.0094 Concentration limits	NR 664 Table 1 and NR 140 Table 1
NR 664.0095 Point of standards application	Per NR 664.0095
NR 664.0096 Compliance period	Closure period
NR 664.0097(1) Number, location, and depth of wells	Current monitoring network
NR 664.0097(2) Multiple units	Current monitoring network
NR 664.0097(3) Casing	Current monitoring network
NR 664.0097(4) Sampling and analysis procedures	Current monitoring program
NR 664.0097(5) Sampling and analysis methods	Current monitoring program
NR 664.0097(6) GW elevation	Current monitoring program
NR 664.0097(7) Establishment of background	Current monitoring program
NR 664.0097(8) Data evaluation and methods	Comparison of results to concentration limits
NR 664.0097(9) Data evaluation and methods	Comparison of results to concentration limits
NR 664.0097(10) Recordkeeping and reporting	Current monitoring program
NR 664.0098 Detection monitoring program	Not applicable, current program includes compliance and corrective action monitoring
NR 664.0099 Compliance monitoring program	Current monitoring program
NR 664.0100 Corrective action program	Current monitoring program

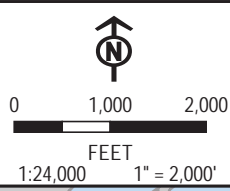
Note:

The current monitoring program is described in the August 30, 2017 Conditional Plan Modification Approval.

COORDINATE SYSTEM: NAD 1983 STATEPLANE WISCONSIN SOUTH FIPS 4803 FEET, MAP ROTATION: 0
 - SAVED BY: AFOJTIK ON 6/25/2025, 16:50:13 PM - FILE PATH: T:\1-PROJECTS\REPUBLIC\KESTREL\HAWK\F2-APRX\557469_KESTREL\HAWK\F.APRX; LAYOUT NAME: 557469_KESTREL\HAWK\F.FIG1



- LIMITS OF WASTE
- 1,000 FT SITE BUFFER
- WATER WELL



PROJECT: KESTREL HAWK LANDFILL
 LONG-TERM CARE PLAN APPLICATION
 RACINE, WISCONSIN

TITLE: TOPOGRAPHIC MAP

DRAWN BY: A. FOJTIK	PROJ. NO.: 557469
CHECKED BY: B. KAHNK	FIGURE 1
APPROVED BY: T. MARTIN	
DATE: JUNE 2025	

999 FOURIER DRIVE
 SUITE 101
 MADISON, WI 53717
 PHONE: 608.826.3663

FILE: 557469_KESTRELHAWKLF

BASE MAP: USGS TOPO MAP
 DATA SOURCE: TRC, WISCONSIN DNR

LIMITS OF WASTE
 NATIVE AMERICAN LANDS



NOTES:
 BASE MAP: GOOGLE EARTH PRO IMAGERY, APRIL, 2021.
 DATA SOURCE: TRC, ARCGIS ONLINE



1:2,160,000
 1" = 34 MILES
 0 50 MILES

PROJECT:	
KESTREL HAWK LANDFILL LONG-TERM CARE PLAN APPLICATION RACINE, WISCONSIN	
TITLE:	
NATIVE AMERICAN LANDS IN WISCONSIN	
DRAWN BY:	A. FOJTIK PROD. NO.: 557469
CHECKED BY:	B. KAHNK
APPROVED BY:	T. MARTIN
DATE:	JUNE 2025

TRC
 999 FOURIER DRIVE
 SUITE 101
 MADISON, WI 53717
 PHONE: 608.265.3665
 557469_KESTRELHAWK.DWG




LIMITS OF WASTE
 100-YEAR FLOODPLAIN

NOTES:
 BASE MAP: GOOGLE EARTH PROMIMAGERY, MAY 2023.
 DATA SOURCE: TRC, FEMA



1:6,000
 1" = 500'
 0 500 FEET

PROJECT:		KESTREL HAWK LANDELL LONG-TERM CARE PLAN APPLICATION RACINE, WISCONSIN	
TITLE:		FLOODPLAIN MAP	
DRAWN BY:	A. FOJTIK	PROD. NO.:	557469
CHECKED BY:	B. KAHNK		
APPROVED BY:	T. MARTIN		
DATE:	JUNE 2025	FIGURE 3	
		999 FOURIER DRIVE SUITE 101 MADISON, WI 53717 PHONE: 608.265.3865	
			
		FILE: 557469_KESTRELHAWK1.DWG	