



Marathon County Solid Waste Department

2021 ANNUAL REPORT – AREA B

WDNR License No. 4228, 3338, 2892
FID 337005680

Marathon County Solid Waste Management Department
172900 Highway 29
Ringle, WI 54471

Solid Waste & Recycling Information Line: 877-270-3989


www.marathoncountysolidwaste.org



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Marathon County Solid Waste Department

172900 State Highway 29

Ringle, WI 54471

Director:	715-446-3101 X104
Site Supervisor:	715-446-3101 X102
Administrative Office:	715-446-3101 X100
Scale Master	715-446-3101 X103
Solid Waste & Recycling Info Line	877-270-3989 toll-free

March 31, 2021

Ms. Sally Hronek
Wisconsin Department of Natural Resources
Waste Management Engineer
2984 Shawano Avenue
Green Bay, WI 54313-6727

Re: Marathon County Solid Waste – Area B Landfill #3338 FID 737092730

Dear Ms. Hronek:

Please accept this submittal of the 2021 Annual Solid Waste Report for the Area B landfill of Marathon County. This Annual Solid Waste Report is being submitted in accordance with the approved Plan of Operation for Area B.

In accordance with your request, two (2) additional hard copies and emailed PDF copies are being distributed to the WDNR staff as noted below.

Should you have any questions or comments regarding this Annual Solid Waste Report, please do not hesitate to contact me at (715) 445- 3101.

Thank you,

David Hagenbucher

Solid Waste Operations Manager
Marathon County Solid Waste Dept
172900 State Highway 29
Ringle, Wisconsin 54471
C: 715-551-5864 O: 715-446-3101x102

CC: C. Lee Daigle, PE – Tetra Tech Senior Project Manager
Nathan Coller – WDNR Spooner Service Center (1 hard copy and 1 electronic copy)
John Morris – WDNR Eau Claire Service Center (1 hard copy and 1 electronic copy)



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Area B Landfill

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Staff, Consultants & Contractors

Marathon County Solid Waste Department Staff:

<u>Director</u>	<u>Meleesa Johnson</u>
<u>Solid Waste Manager</u>	<u>Dave Hagenbucher</u>
<u>Environmental Resource Specialist</u>	<u>Eric Olson</u>
<u>Solid Waste Scale Master</u>	<u>Allison Birr</u>
<u>Accounting and Business Specialist</u>	<u>Julie Groshek</u>
<u>Waste Specialist</u>	<u>Justin Brooks</u>
<u>Waste Specialist</u>	<u>Jeff Woodard</u>
<u>Waste Specialist</u>	<u>Ryan Miller</u>
<u>Waste Specialist</u>	<u>Dustin Ziereis</u>
<u>SW Specialist / Mechanic</u>	<u>Chris Wickman</u>
<u>EHS & Compliance Specialist</u>	<u>John Peralta</u>
<u>LTE</u>	<u>Amberlea Kaiser</u>
<u>Intern</u>	<u>Ian Munger</u>

Engineering Consultants:

- Mark Torresani, P.E.
Cornerstone Environmental Group, a Tetra Tech company
8413 Excelsior Drive, Suite 160
Madison, WI 53717
- Lee Daigle, P.E.
Cornerstone Environmental Group, a Tetra Tech company
8413 Excelsior Drive, Suite 160
Madison, WI 53717
- Cynthia Neitzel
Geo-Logic Associates
15020 N. Hayden Rd., Ste 205
Scottsdale, AZ 85260

Contractors:

- Ahern Fire Protection
- CQM, Inc.
- RDO Integrated Controls
- Northern Lakes Service, Inc.
- Northern Pipe, Inc.
- Recycling Connections Corporation
- Veolia ES-Technical Solutions
- Lloyd Trucking
- Marathon County Forestry Depart.
- Krueger & Stienfest, Inc
- Walt's Petroleum Service, Inc
- River View Construction, Inc.
- Oakridge Engineering
- QED Environmental Systems
(Trinity Environmental Equipment))
- Global Containment Systems GCS
- Golder Associates Inc.
- SEH Engineering
- E-Con Electrical, Inc.
- Valley Scale Service
- Van Ert Electrical Company
- Wisconsin Public Service

Introduction

This report provides a summary of site conditions, work conducted at, and other activities related to the active Area B Landfill (Area B) during 2021. This report is intended to meet the intent and focus of the annual reporting requirements, found in all approved documentation for Area B. This document meets the annual reporting requirements of the Wisconsin Department of Natural Resources (WDNR) Plan of Operation Approval dated March 22, 2002, the 2006 plan modification for the expansion of Phase IV, and the 2013 Modification to the Monitoring Plan (for Groundwater, Lysimeters and Leachate Collection).

Area B Background

Marathon County Solid Waste Department (MCSWD) owns, operates, and manages the Area B Landfill (Area B). The 32-acre facility opened in 1993 and has an amended design capacity of 2,508,000 cubic yards. Approximately 5 acres have final cover. The site is located along the north side of Hwy 29, in the town of Ringle, Wisconsin, and north of the closed Area A Landfill.

MCSWD and various contracted firms have worked, and will continue to work, collaboratively to ensure operations and post-closure activities are conducted in accordance with all required current and long-term care approvals. This includes, but is not limited to, operation of and maintenance of the following systems: intermediate cover, final cover, storm water, landfill gas and condensate, leachate collection, and groundwater monitoring.



Summary of Landfill Activities in 2021

From 1994 to early 2014, MCSWD retained an independent contractor to conduct operations. MCSWD began internal operations of the landfill with its own staff and equipment in May 2014. Operational duties typically include, but are not limited to, full-time administrative management, active fill area management and scale operations (when accepting wastes), site operational oversight, and trouble-shooting and other maintenance and conditionally regulated duties such as:

- Monthly visual inspections of the final cover surface
- Inspections of storm water management pathways
- Removal of obstructions or repair to storm water pathways
- Mowing pathways for surface emission monitoring work
- General mowing to control for woody herbaceous growth
- Snow plowing of access roads
- Grading and dust management of access roads using calcium chloride was applied to both interior landfill roads and gravel site roads
- Preventative maintenance on gas system and leachate pumping system
- Cover maintenance including repair of leachate seeps
- Daily operations with waste acceptance, compaction, and cover

As needed, MCSWD hired various contractors and/or consultants to perform specific tasks beyond the capabilities of the site staff, such as air permit compliance and reporting and contracted leachate hauling.

Waste Disposal Activities

During 2021, approximately 6053 tons of waste were accepted in Area B and disposed on top of Phase IV. The tonnage received was categorized as Category 25-construction and demolition, and category 5 – sludge from wastewater treatment. There were no issues or problems handling the wastes delivered.

Special Wastes

Area B is licensed to accept non-hazardous special waste, including contaminated soils. Special waste tonnages disposed at the site, provided in the tons reported to the state as identified above, included approximately 0 tons of contaminated soil (C-Soil). However, 1370 tons of beneficial reuse soil were utilized for cover materials in 2021. Waste was placed in Area B during 2021, primarily to prepare the site for closure, which is anticipated to occur in 2023.

MCSWD pre-screens all special wastes via a Special Waste Profile form. Customers desiring to deliver non-standard wastes must complete the form and provide it to MCSWD staff for review and approval. The generator of waste, or their agent, must complete the form and have a variety of select laboratory tests conducted on the special waste, prior to a decision being made on acceptance. The MCSWD Special Waste Analytical Protocol and Acceptance Criteria delineates parameter thresholds the waste material must meet in order to qualify as a non-hazardous special waste. No special wastes are accepted without first completing this process. Records are retained on site. In 2021, the site had no non-approved wastes.

Settlement Monitoring

Very little settlement occurred in Area B during the past few years at the location of the Settlement Points. The below tables summarize the Area B settlement monitoring points for the period of September 2021 to December 2021

Settlement Points 9-13-21				
SP	North	East	Elevation	
			Ground	Top
North	8001.21	15699.12	1402.24	1404.73
South	7597.81	15500.33	1400.71	1403.72

Settlement Points 12-14-21				
SP	North	East	Elevation	
			Ground	Top
North	8001.44	15699.17	1402.27	1404.72
South	7597.75	15500.2	1400.73	1403.73



Area B south side looking east.

Landfill Maintenance

Marathon County Solid Waste continued maintenance and service on all leachate collection infrastructure. Numerous panels and pumps were repaired throughout the year as aging infrastructure continues to be replaced. During the final cap project in 2023, the intent is to replace all pump and panel infrastructure to ensure reliability and longevity of the final closure.

To follow protocol and best management practices in regard to surface emissions, MCSWD staff applied a large quantity of bentonite around all penetration points on Area B. The bentonite acted as a seal to prevent emissions from finding their way above the landfill surface. All surface emission

monitoring was completed without compliance issues, thus providing confirmation that the seals worked well.

Throughout 2020 and 2021, MCSWD staff implemented the use of “well-bore” seals around landfill gas wells. 8ft by 8ft geomembrane liner was placed on the ground around the base of landfill gas wells. This work minimized oxygen intrusion and moisture intrusion. It allowed greater vacuum to be applied without pulling excessive amounts of oxygen.

In the spring of 2021, a landfill seep along the transition from final cover to intermediate cover was observed on the south side of the landfill. Solid waste staff promptly responded by excavating the area to fix the issue. During the excavation process, it was identified that municipal solid waste was placed over a layer of dirt. The dirt acted as an impermeable layer, thus causing the leachate to find an alternate route. Operators excavated the area and thoroughly removed the layer of dirt that was blocking the drainage path. After excavation, clean washed drainage stone was used to backfill the location to ensure adequate drainage of leachate. A vertical pipe was also installed within the area as a safety measure to allow continuous monitoring of the liquid drainage process. Excavated material was hauled away for disposal, and clean dirt, along with grass seed and compost was used to restore the area.



Area B transition area seep excavation

Gas Collection System

Area B, located on the northern portion of the entire 574-acre facility (and north of the closed Area A Landfill), has an active landfill gas extraction system consisting of gas collectors and transfer piping, blower to move the gas collected and end-use equipment (described below). The landfill gas extraction system has been operational since the late 1990s. Landfill gas emissions from the entire MCSWD property, including Area B, are regulated in accordance with Air Pollution Control Operation Permit No. 737092730-P20 dated November 2, 2015.

The gas wells located in Area B consist of vertical and horizontal gas extraction wells, connected via a sub-header system within the footprint of the landfill. The landfill gas extracted from the landfill is transferred to the on-site landfill gas recovery building (located south of the Area A Landfill) via a header pipe to a landfill gas to energy plant or to a flare. Vacuum applied to the wellfield is regulated

by the variable frequency drive (VFD) blower station that controls the gas collection and control system (GCCS). A map of the Area B GCCS, following improvements made in 2015, is provided in Attachment A.



Area B gas well pumping operations.

Existing sensing devices measure gas flow rates, pressure, vacuum, and methane and oxygen concentrations. These sensors are located on the main header line pipe leading into the gas recovery building and includes gas collected from Area A, Area B, and BRRDF landfills. Data is recorded and stored on a computerized data collection system. This data is used for operating and reporting purposes.

The Marathon County GCCS operated 97.39% of the year with approximately 8,531 hours of operation. The average aggregated flow rate for the site GCCS was approximately 991.32 standard cubic feet per minute (scfm). Methane and oxygen concentrations of landfill gas averaged, by volume, 51.2% for methane and 1.0% oxygen. Total gas collected from the site in 2021 was 521,423,435 standard cubic feet (scf). From the total gas collected at the site, 330,757,367 scf was used for production of electricity, and 190,666,065 scf was sent to the flare. The table below summarizes the aggregated flow, combustion location, and vacuum of the GCCS at the site.

In addition to the gas work performed under the site's air permit, Solid Waste operations conducted aggressive well pumping on a number of locations that had liquid build up. While the wells continued to be in compliance, it was noted that liquids had accumulated within the perforated gas wells. Pneumatic pumping systems were set up to extract liquids and allow more efficiency of the collection system. This process also aided efforts to reduce off site odor migration. In late 2021, the site received a number of odor complaints, and pumping of gas wells was an effort that was implemented to add efficiency to the collection process. Liquids removed were pumped directly into the leachate collection system.

2021 MARATHON COUNTY GCCS DATA (INCLUDES AREA A, AREA B & BRRDF)

Month	Total CFM	CFM Electric	CFM Flare
Jan	35,959,532	27,938,094	8,021,438
Feb	35,825,333	25,732,988	10,092,346
Mar	43,580,196	33,750,304	9,829,892
Apr	40,717,387	24,682,637	16,034,749
May	42,083,634	33,843,475	8,240,159
Jun	40,450,546	29,496,315	10,954,231
Jul	41,807,723	29,290,360	12,517,363
Aug	44,903,303	30,591,052	14,312,251
Sep	44,014,624	30,770,976	13,243,647
Oct	51,063,231	29,774,114	21,289,117
Nov	47,783,789	32,177,269	15,606,519
Dec	53,234,137	2,709,783	50,524,353
Totals	521,423,435	330,757,367	190,666,065

Below is a chart listing average monthly vacuum, methane (CH₄), and oxygen (O₂) concentrations of the site GCCS (combined Area A, Area B, and BRRDF landfill gas).

2021 GCCS Vacuum and Concentrations	Ave Vacuum (negative inches water column)	Ave CH ₄ %	Ave O ₂ %
January	26.25	50.3	1.1
February	26.50	49.6	1.3
March	25.80	50.8	1.1
April	26.40	51.9	1.0
May	25.90	51.6	1.1
June	26.40	52.4	0.9
July	24.50	53.7	0.5
August	24.30	52.5	0.8
September	24.90	50.5	0.8
October	25.00	48.7	0.9
November	26.10	51.5	1.0
December	26.00	50.5	1.0
Average	25.67	51.2	1.0

Gas System Outages

As indicated previously, the gas extraction system operated nearly continuously. Any shutdowns, whether for planned maintenance or unplanned events were reported to the WDNR Air Management staff. The January to June 2021 Semi-annual Report and July to December 2021 Semi-annual Report for the facility include descriptions of the startup, shutdown, and malfunction events associated with the GCCS, single control devices, and the continuous monitoring system.

Surface Emission Monitoring

Surface emission monitoring (SEM) of Area B was conducted quarterly in 2021 . Any exceedences were immediately corrected and put into compliance. Details can be found in attachment B.

For all SEM events, a flame ionization detector (FID) is used while MCSWD's environmental technician walks a serpentine pattern across the surface of the landfill. Results of the monitoring are provided in Attachment B.

To follow protocol and best management practices in regard to surface emissions, MCSWD staff applied a large quantity of bentonite around all penetration points on Area B in 2020 and enhanced them in 2021. The bentonite acted as a seal to prevent emissions from finding their way above the landfill surface. All surface emission monitoring was completed without compliance issues, thus providing confirmation that the seals worked well.



Area B wellbore seals continued to be used in 2021.

Soil Gas Monitoring

During 2021, the soil gas probes were monitored quarterly for relative pressure, methane (CH₄), oxygen (O₂), and soil gas pressure. In 2021, these monitoring results indicated no gas migration.

First Quarter Probe Data (January 20, 2021):

Gas Probe	Location	Methane (%CH ₄ by Vol.)	Oxygen (%O ₂ by Vol.)	Pressure (inch W.C.)	Notes:
[Depth in feet]					
Lic. 3338	WDNR Parm #	85547	85550	46389	WDNR ID No.
Area B Probes					
G-5 [26']	S Area B	0	20.8	0.15	710
G-6 [30']	W Area B	0	21.5	0	712
G-7 [20']	N Area B	0	22.5	-0.02	714
G-8 [15']	E Area B	0	21.2	0.03	716

Second Quarter Probe Data (April 23, 2021):

Gas Probe	Location	Methane (%CH ₄ by Vol.)	Oxygen (%O ₂ by Vol.)	Pressure (inch W.C.)	Notes:
[Depth in feet]					
Lic. 3338	WDNR Parm #	85547	85550	46389	WDNR ID No.
Area B Probes					
G-5 [26']	S Area B	0	18.8	-1.29	710
G-6 [30']	W Area B	0	18.4	-1.16	712
G-7 [20']	N Area B	-	-	-	714
G-8 [15']	E Area B	0	18	NR	716

Third Quarter Probe Data (July 22, 2021):

Gas Probe	Location	Methane (%CH ₄ by Vol.)	Oxygen (%O ₂ by Vol.)	Pressure (inch W.C.)	Notes:
[Depth in feet]					
Lic. 3338	WDNR Parm #	85547	85550	46389	WDNR ID No.
Area B Probes					
G-5 [26']	S Area B	0	18.7	-0.55	710
G-6 [30']	W Area B	0	18	-0.06	712
G-7 [20']	N Area B	0	17.8	-0.02	714
G-8 [15']	E Area B	0	16.2	0	716

Fourth Quarter Probe Data (November 18, 2021):

Gas Probe	Location	Methane (%CH ₄ by Vol.)	Oxygen (%O ₂ by Vol.)	Pressure (inch W.C.)	Notes:
[Depth in feet]					
Lic. 3338	WDNR Parm #	85547	85550	46389	WDNR ID No.
Area B Probes					
G-5 [26']	S Area B	0	21.6	-0.45	710
G-6 [30']	W Area B	0	20.2	-0.07	712
G-7 [20']	N Area B	0	20.2	-0.01	714
G-8 [15']	E Area B	0	18.3	-0.04	716

Gas Condensate Sampling Data

In accordance with the monitoring plan, gas condensate was sampled and analyzed in April and October 2021. A summary of the tested analytes is provided in the table below and includes inorganic constituents and detected volatile organic compounds (VOCs).

2021 Gas Condensate Detection Results				
Parameter	Units	April	October	
Conductivity	umho/cm @25C	1140	5920	
pH	S.U.	6.72	7.58	
TSS	mg/L	50	ND	
COD	mg/L	89	200	
VOCs				
Acetone	ug/L	ND	ND	
Ethylbenzene	ug/L	ND	ND	
Methyl Ethyl Ketone	ug/L	ND	ND	
Naphthalene	ug/L	ND	ND	
Tetrahydrofuran	ug/L	ND	ND	
Toluene	ug/L	ND	ND	
Xylene, o-	ug/L	ND	ND	
Xylene, m- & p-	ug/L	ND	ND	

Gas Condensate Volumes

Gas condensate volumes were monitored and tabulated on a monthly basis. The 2021 gas condensate volumes are summarized below:

2021 Area B Condensate Volume Pumped (Gallons)					
Month	CKO-1 gallons	CKO-2 gallons	GC-Manhole gallons	GC-1 gallons	CS-1 gallons
Jan	1092	672	252	0	1512
Feb	1176	756	252	0	2688
Mar	2016	1260	756	84	2856
Apr	1512	1008	756	0	2520
May	1680	40404-pump replaced	336	0	2268
Jun	2100	1428	588	2016	2688
Jul	1764	756	420	7392	3024
Aug	1596	840	504	3108	3108
Sep	1932	840	420	4536	4032
Oct	2100	924	504	0	3864
Nov	1764	672	420	5796	2604
Dec	2016	Hrs Meter Out of Service	504	0	5712
TOTALS	20748	49560	7392	22932	36876

Gas Sampling Data

On October 25, 2021, MCSWD's environmental technician, with assistance from Tetra Tech, used a summa canister to collect a sample of landfill gas for VOC analysis. The full canister was shipped via express mail services to Air Technology Labs, Inc. (ATL) in City of Industry, California for analyses of volatile organic compounds. The test method used was United States Environmental Protection Agency (EPA) test method TO-15, Determination of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters and Analyzed by Gas Chromatography/ Mass Spectrometry (GC/MS). Results of the testing performed by ATL are provided as Attachment C to this report.



Summa-canister

Leachate System Information

Leachate is collected throughout the Area B landfill with a leachate collection system at the base of the landfill. This includes an aggregate leachate drainage layer and a series of leachate collection trenches and pipes that drain to leachate collection sumps. Leachate gathers in the sumps and is pumped out of the landfill through a side slope riser force main to storage tanks. There are five (5) sumps, 5 riser pipes and 3 storage tanks associated with Area B. Pumping from the side slope risers stops when a sensor system inside the storage tank indicates the liquid has reached a certain level. The contracted leachate hauler pumps the stored leachate into a 6,600-gallon tanker truck and delivers the material to one of three waste water treatment facilities (WWTF) for disposal.

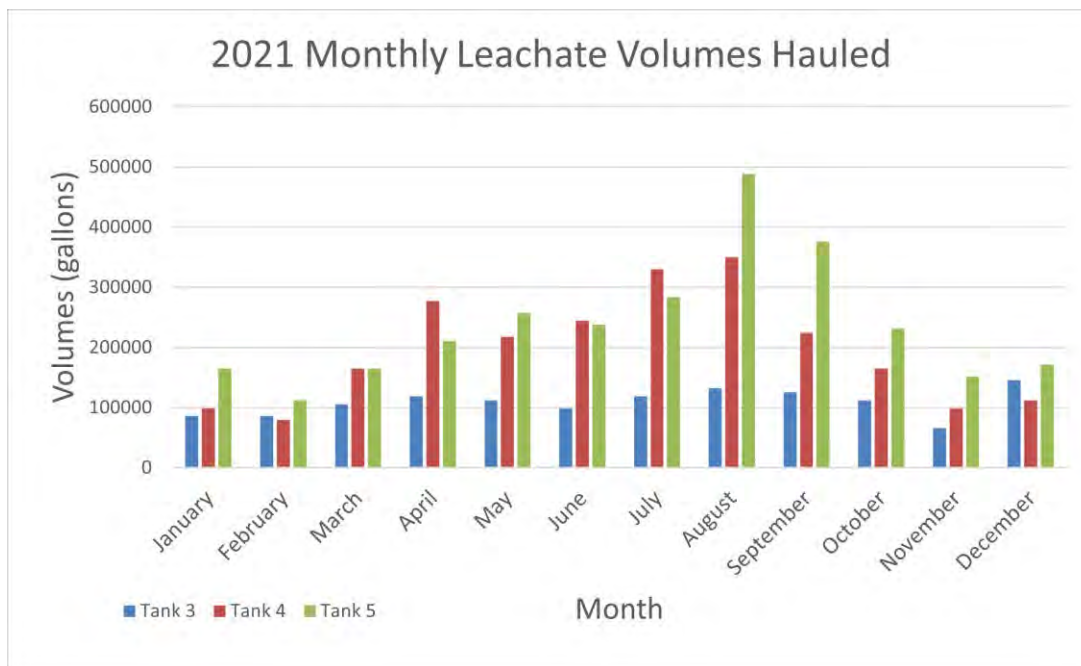
Leachate collected in 2021 was transported to the following facilities: Wausau Wastewater Treatment; the Plover Wastewater Facility, or the Stevens Point Wastewater Utility in Stevens Point,

Wisconsin. Leachate is pumped into the WWTF and treated to ensure all effluent meets Wisconsin Pollutant Discharge Elimination System (WPDES) standards.

Preventative maintenance of the leachate storage and pumping system was conducted, as needed, by on-site operations or other tank and pump specialists when required.

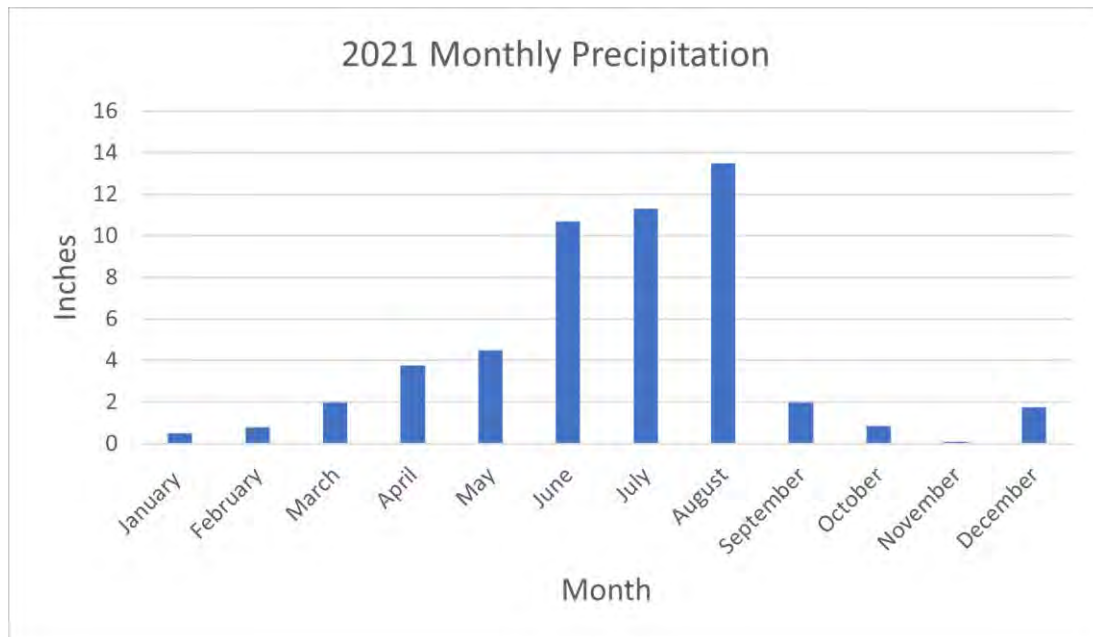
Total volume (gallons) of leachate collected/transported/treated in 2021 is as follows:

2021	Tank 3	Tank 4	Tank 5
January	85800	99000	165000
February	85800	79200	112200
March	105600	165000	165000
April	118800	277200	211200
May	112200	217800	257400
June	99000	244200	237600
July	118800	330000	283800
August	132000	349800	488400
September	125400	224400	376200
October	112200	165000	231000
November	66000	99000	151800
December	145200	112200	171600
Totals	1,306,800	2,362,800	2,851,200



2021 Precipitation

Month	Inches
January	0.5
February	0.8
March	2
April	3.75
May	4.5
June	10.7
July	11.3
August	13.5
September	2.6
October	0.85
November	0.1
December	1.75
Total	51.75



Marathon County Solid Waste conducted a large intermediate cover hauling project in 2021 to better divert stormwater from the surfaces on Area B. The project consisted of hauling clean soil to areas that were believed to be contributing to liquid infiltration. Better grading and soils that eliminated infiltration were used along the western portion, the northern portion, and some areas along the south side. The results of the project were impressive, and effectively reduced leachate numbers by nearly 50% compared to previous years. The soils were vegetated by using seed and compost to prevent erosion.

Diverting storm water leads to less leachate, which also reduces landfill gas generation within the waste mass, and thus allows for greater efficiency in the gas collection and control system.



Area B north side intermediate cover haul – spring 2021



Area B south side intermediate cover haul – spring 2021

Leachate Line Jetting

In June 2021, Northern Pipe, Inc. of Green Bay, Wisconsin, water jetted the leachate lines of Area B. Jetting was accomplished by accessing each pipe at one end and jetting the full length of pipe. Each line was televised in 2018. No issues were reported with this jetting event. The report for Area B jetting is provided as Attachment D.



Leachate jetting Area B

Leachate Sampling

Leachate sampling and analytical analysis were conducted for Area B Tanks 3, 4, and 5 in April and October 2021 by Northern Lakes Services (NLS). VOCs and metals were sampled semi-annually and semi-volatile organics were sampled and tested in October only. Sampling results show a variety of compounds present that are consistent with previous sampling results. Full results are available on the WDNR Groundwater and Environmental Monitoring System (GEMS) database and are maintained in site files. Conductivity and pH values reported in 2021 are summarized below.

Leachate	2021	Conductivity	pH
		umho/cm	S.U.
Tank 3	April	10400	7.24
	October	11430	7.36
Tank 4	April	4920	6.70
	October	9120	7.24
Tank 5	April	8000	7.33
	October	10200	7.5

Leachate Level Monitoring

Leachate level monitors were evaluated on a quarterly basis by the MCSWD's environmental technician. Data from those monitoring events is as follows:

Marathon County Solid Waste							
Leachate Head Well Monitoring							
Area B	LLM 2	LLM 3	LLM 4	LLM 5	LLM 6	LLM 7	LLM 8
Pipe Length to Elbow (ft.)	100	102	95	100	119	115.9	116.8
Date	Depth to Liquid	Depth to Liquid	Depth to Liquid	Depth to Liquid	Depth to Liquid	Depth to Liquid	Depth to Liquid
March	Dry	Dry	Dry	Dry	0.25	0.25	0.3
June	0.5	Dry	0.5	Dry	1.0	0.25	Dry
September	0.5	1.0	1.0	1.0	1.0	Dry	Dry
December	dry	2	1	dry	3.5	dry	dry

Lysimeters

Northern Lakes Services, Inc. monitored Lysimeter 7 in April and October 2021 with additional monitoring for VOCs in October. Sampling results were submitted electronically to the WDNR GEMS database and are consistent with previous sampling results. A summary table of inorganic constituents from the lysimeter sampling event is provided below:

Project: Marathon County Landfill - Area B October 2021									
Lysimeter L-7 NLS ID: 1285744									
Matrix: WW									
Collected: 10/25/21 15:44 Received: 10/25/21									
Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab	
Field color	natural					10/25/21	NA	721026460	
Field conductivity	702	umho/cm@25C	1			10/25/21	EPA 120.1	721026460	
Field odor	putrid					10/25/21	NA	721026460	
Field pH	7.09	s.u.	1			10/25/21	4500-H+B-2000	721026460	
Field turbidity	extreme, mixed, brown					10/25/21	NA	721026460	
Field volume pumped	1.00	gallon	1	0.0*		10/25/21	NA	721026460	
Alkalinity, tot. as CaCO3 (unfiltered)	300	mg/L	1	1.0	2.0	11/02/21	2320 B-1997	721026460	
Boron, tot. recoverable as B by ICP	980	ug/L	5	90	300	11/01/21	EPA 200.7, Rev 4.4	721026460	
C.O.D. (unfiltered)	71	mg/L	1	1.6	5.2	10/26/21	5220 C-1997	721026460	
Chloride, as Cl (unfiltered)	44	mg/L	1	0.32	2.0	10/27/21	EPA 300.0, Rev 2.1	721026460	
Hardness, tot. recoverable, (calc/unfilt/icp)	500	mg/L	5	2.4	8.0	11/01/21	EPA 200.7, Rev 4.4	721026460	
Nitrogen, NO2 + NO3 as N (unfiltered)	0.44	mg/L	1	0.040	0.14	11/02/21	4500-NO3 F-2000	721026460	
Sodium, tot. recoverable as Na by ICP	34	mg/L	5	0.60	2.1	11/01/21	EPA 200.7, Rev 4.4	721026460	
Sulfate, as SO4 (unfiltered)	15	mg/L	1	0.28	2.0	10/27/21	EPA 300.0, Rev 2.1	721026460	
Metals digestion - tot. recov.ICP	yes					10/27/21	EPA 200.7	721026460	
VOCs (water) by GC/MS	see attached					10/29/21	EPA 624	721026460	

Final Cover

There are approximately 5 acres of final cover constructed at the Area B Landfill. The existing final cover areas remain in excellent condition. As required by the site's plan of operation, and to ensure the investment in final cover is not compromised, the following activities are conducted throughout the year:

- Monthly visual inspections of the final cap surface
- Inspections of storm water management pathways
- Removal of obstructions or repair to storm water pathways
- Mowing pathways for surface emission monitoring work
- General mowing to control for woody herbaceous growth
- Snow plowing of access roads
- Grading and dust management of access roads
- Preventative maintenance of gas system and leachate pumping system

Storm Water Management

There are four storm water management diversion and collection areas associated with Area B. Storm water is channeled away from the closed and intermediate cover areas of the landfill and away from exterior roads and flows to one of the sedimentation and retention ponds identified as SR-1 through SR-4. Storm water and retention pond SR-3 is used as a source of water for operational dust control; a tanker truck is filled with water and then applied to the various roadways. An annual storm water inspection was performed in June 2021. This included the general inspection of ditches associated with Area B. This inspection is provided as Attachment E.

The basins are observed as a general course of site inspections by MCSWD. Water height, clarity, and turbidity are noted. There has been no need to conduct maintenance on the basins. Storm water grates are also observed with this routine and cleared of materials that may impede the proper flow of storm water.

Groundwater Monitoring & Analysis

Please refer to the 2017 – 2020 three-year groundwater assessment for more detailed information about site groundwater conditions and status. Additionally, Tetra Tech will be conducting another groundwater analysis with more details about current site conditions in 2022, specifically on well R27, which has had nitrate concerns. At the beginning of 2021, MCSWD had a total of 91 groundwater monitoring wells, with 25 designated for Area B. The groundwater monitoring regimen was conducted according to the February 7, 2013, approved modification to the groundwater and leachate monitoring plan.

Per the approved monitoring plan, the groundwater wells within the plan were sampled semi-annually in April and October. Sampling and laboratory analysis was conducted by qualified personnel from Northern Lake Service (NLS) of Crandon, Wisconsin. The groundwater samples were analyzed to very low chemical concentrations with many found to be below the laboratory's limit of quantification (LOQ). The groundwater quality measurements were compared to NR 140 Groundwater Preventive Action Limits (PALs) and Enforcement Standards (ESs) and site-specific indicator PALs and Alternate Concentration Limits (ACLs) provided in the approved monitoring plan. Results revealed that most of the monitoring wells do not exceed these limits and even meet safe drinking water standards.

Reporting values higher than these limits are reported as exceedances. As in past monitoring events at the Area B site, results at some wells exceeded the PAL and ES standards. The exceedances noted in the tables below include nitrate + nitrite as nitrogen at two downgradient wells which may be attributable to area agricultural practices or runoff from erosion control efforts that include seeding, fertilizing, and mulching at and near the Area B landfill. Groundwater monitoring results and any exceedances were submitted electronically by NLS to the WDNR's GEMS database. Below is a summary of the exceedances from each semi-annual monitoring period. The exceedance reports submitted to the WDNR for the April and October 2021 monitoring event are provided in Attachment F.

N+N exceedances of NR 140 Groundwater Quality Standards at two Area B Landfill downgradient wells have continued to be present. Upgradient wells R20AR and R30 have reported historical N+N concentrations below 1.0 mg/L. The upgradient well R20AR has exhibited an increasing trend in N+N concentrations, but the concentrations are still below the downgradient well concentrations and the NR 140 PAL. As a result, the elevated N+N downgradient of the Area B Landfill appears to be attributable to the Area B Landfill. The N+N concentrations downgradient of the Area B Landfill will continue to be monitored to further assess the current trends. Tetra Tech and Marathon County are working closely with WDNR to identify these concerns and will have more information available in 2022 on this matter.

Private Well Water Sampling

There are no private wells monitored as part of Area B landfill environmental monitoring.

Landfill Gas Monitoring

Landfill Gas monitoring was conducted on a monthly basis in accordance with the site's Air Pollution Control Operation Permit 737092730-P20. The results of each monthly monitoring event are provided to both the solid waste and air departments of the WDNR on a monthly basis. A thorough review of all Gas Collection and Control System upgrades is included in the Bluebird Ridge Annual Report.