Regular Meeting of the Mt. Pleasant City Commission
Monday, March 25, 2024
7:00 p.m.

AGENDA

CALL TO ORDER:

PLEDGE OF ALLEGIANCE:

LAND ACKNOWLEDGEMENT STATEMENT:

ROLL CALL:

PROCLAMATIONS AND PRESENTATIONS:

1. Proclamation recognizing International Transgender Day of Visibility presented to Derek Davis.
2. Presentation of the 2023 Community Improvement Awards.
3. Presentation by Center for Public Safety Management (CPSM) on Fire Department and EMS analysis.

ADDITIONS/ DELETIONS TO AGENDA:

PUBLIC INPUT ON AGENDA ITEMS:

RECEIPT OF PETITIONS AND COMMUNICATIONS:

4. Receipt of 2023 Electric Scooter Review.
5. Receipt of the 2023 Planning Commission Annual Report.

CONSENT ITEMS:

6. Approval of the minutes from the regular meeting held March 11, 2024.
7. Consider a resolution supporting submittal of Michigan Department of Natural Resources Trust Fund Grant application for the proposed 2025 Mid-Michigan/GKB Pathway North Connection Project.
8. Consider approval of Payrolls and Warrants.

PUBLIC HEARINGS:

NEW BUSINESS:

9. Consider a contract with Fleis & Vanderbrink for the 2024 Design and Engineering Services for the 2025 Mid-Michigan/GKB Pathway North Connection Project.

All interested persons may attend and participate. Persons with disabilities who need assistance to participate may call the Human Resources Office at 989-779-5313. A 48-Hour advance notice is necessary for accommodation. Hearing or speech impaired individuals may contact the City via the Michigan Relay Service by dialing 7-1-1.

10. Consider a proposal for a community orchard in conjunction with the City of Mt. Pleasant Community Garden.
11. Prioritize and approve submission of City requests for Saginaw Chippewa Indian Tribe 2% allocations.

ANNOUNCEMENTS ON CITY-RELATED ISSUES AND NEW BUSINESS:

PUBLIC COMMENT ON AGENDA AND NON-AGENDA ITEMS:

RECESS:

WORK SESSION:

12. Discussion on natural landscaping.

RECESS:

CLOSED SESSION:

13. Consider closed session pursuant to subsection 8(h) of the Open Meetings Act to consider material exempt from discussion or disclosure by state or federal statute.

ADJOURNMENT:

TO: MAYOR AND CITY COMMISSION MARCH 25, 2024

FROM: AARON DESENTZ, CITY MANAGER

SUBJECT: CITY MANAGER REPORT ON AGENDA ITEMS

Proclamations and Presentations:

3. Presentation by Center for Public Safety Management (CPSM) on Fire Department and EMS analysis.

    a. CPSM Senior Manager Joseph Pozzo will present the findings of the fire department analysis at the March 25th City Commission meeting. Joseph can answer any questions the City Commission may have related to the analysis. A copy of the presentation and the report can be found in the City Commission meeting packet.

Receipt of Petitions and Communications:

Consent Items:

7. Consider a resolution supporting submittal of Michigan Department of Natural Resources Trust Fund Grant application for the proposed 2025 Mid-Michigan/GKB Pathway North Connection Project.
    a. The Parks Department is preparing an application for a Michigan Department of Natural Resources (MDNR) Michigan Natural Resources Trust Fund Grant for the proposed 2025 Mid-Michigan/GKB Pathway North Connection Project. This section of pathway will connect Nelson Park to Mission Creek Park. This is the same grant program that the department has applied for in the past for this same project. The application is for $400,000 of grant funding. The state requires applicants to hold a public hearing on their application and pass a Resolution as part of the completed grant package. The public hearing on the proposed project was held in 2022. With no further changes, the City Commission need only adopt the proposed Resolution.

Public Hearings:

New Business:

9. Consider a contract with Fleis & Vanderbrink for the 2024 Design and Engineering Services for the 2025 Mid-Michigan/GKB Pathway North Connection Project.
    a. The City Commission is requested to authorize award of the contract for the 2024 Design and Engineering Services – GKB/Mid-Michigan Pathway North Connection to Fleis & Vanderbrink (F&V) for a total price of $169,100. F&V was the low bidder on the project and has provided successful work to the City in past projects of similar scope.

        Recommended Action: A motion to approve the award of the contract for the 2024 Design and Engineering Services – GKB/Mid-Michigan Pathway North Connection to Fleis & Vanderbrink for a price of $169,100.

10. Consider a proposal for a community orchard in conjunction with the City of Mt. Pleasant Community Garden.
    a. Director of Parks and Recreation Phill Biscorner has prepared the attached report related to the Mt. Pleasant Community Garden. Staff is proposing the addition of a community orchard at the Community Garden.

       Recommended Action: No action required. Staff is seeking support and feedback from the City Commission on the proposed orchard.

11. Prioritize and approve submission of City requests for Saginaw Chippewa Indian Tribe 2% allocations.
    a. The City Commission annually reviews staff requests for 2% Allocation Grants through the Saginaw Chippewa Indian Tribe. Proceeds from certain types of gaming are offered by the SCIT as part of this grant program. As part of this review the City Commission is asked to rank the top five (5) projects for consideration from the Tribe. Each Commissioner will state their top five (5) projects that are a priority for them. We will then provide the collective top 5 ranking to the Tribe while submitting all the grant applications to them. The Tribal Council considers these priority projects listed by the City Commission when making their awards.

       Recommended Action: Feedback on the top 5 projects is needed from each City Commissioner.

Work Session:

12. Discussion on natural landscaping.
    a. The City Commission discussed natural landscaping at its October 9th, 2023 meeting and the February 12, 2024 meeting. Staff used the feedback from those meetings to draft an ordinance which will be discussed at the upcoming work session. Public Safety Director Paul Lauria will review the ordinance with the City Commission. From there any final edits to the ordinance will be made before an introduction to the City Commission for consideration of adoption.

Closed Session:

13. Consider closed session pursuant to subsection 8(h) of the Open Meetings Act to consider material exempt from discussion or disclosure by state or federal statute.
    a. The City Commission is requested to go into a closed session to consider material exempt from discussion or disclosure by state or federal statute.

       Recommended Action: A motion to go into closed session pursuant to subsection 8(h) of the Open Meetings Act to consider material exempt from discussion or disclosure by state or federal statute.

PROCLAMATION

WHEREAS, International Transgender Day of Visibility was founded in 2009 by U.S.-based transgender activist Rachel Crandall-Crocker, a licensed psychotherapist, and the Executive Director of Transgender Michigan, created to acknowledge and honor the successes achieved by transgender people; and

WHEREAS, Organizations across the world celebrate International Transgender Day of Visibility as an annual day to celebrate the accomplishments and victories of transgender and gender non-conforming people while raising awareness of the work that is still needed to save transgender lives; and

WHEREAS, International Transgender Day of Visibility is intended to recognize and celebrate the work that is being done by Transgender advocacy groups as they fight for dignity and equal rights for members of the Transgender community, to build inclusive and healing spaces, and to protect and defend those who are most vulnerable; and

WHEREAS, the City of Mt. Pleasant recognizes the significant contributions made by Transgender people and affirms that they are vital members of our community.

NOW, THEREFORE I, Amy Perschbacher, Mayor of the City of Mount Pleasant, do hereby proclaim March 31, 2024, as

INTERNATIONAL TRANSGENDER DAY OF VISIBILITY

in Mt. Pleasant in coordination with cities across the world.

In Witness Whereof, I have hereunto set my hand and Great Seal of the City of Mount Pleasant, Michigan, this 25th day of March 2024.

_____

Amy Perschbacher, Mayor
City of Mount Pleasant

Memorandum

Mt. Pleasant [meet here]

TO: Aaron Desentz
City Manager

FROM: Manuela Powidayko
Director of Planning & Community Development

DATE: March 25, 2024

SUBJECT: 2023 Community Improvement Awards

Since 1979, the Planning Commission has presented a Community Improvement Award for residential and commercial projects. These awards are a way for the Planning Commission to acknowledge property owners for investment in our community.

Projects that were completed during calendar year 2023 were eligible for consideration.

The following properties were selected by the Planning Commission for recognition:

Category	Address	Owner
Commercial	502 N Mission St	The Woods - Marijuana Dispensary (502 N Mission LLC)
Residential	111 Russell	Charles & Leigh Crespy
	207 N Fancher	Hunter Campbell

This year's award photographs were produced by Dan Gaken Images.

Requested Action:

The Mayor present the awards at the March 25, 2024 City Commission meeting.

Attachment:
1. 2023 Community Improvement Award Nominees (Voting Sheets)

2023 Community Improvement Award Nominees
Residential Category

☑ Please vote for one winner

	BEFORE	AFTER
☐ Vote 111Russell Owner: Charles & Leigh Crespy *Residential Alteration (Built a new studio at the back of the property)*	 (Google Maps July 2014)	 (Staff Photo February 2023)
☐ Vote 207 N Fancher Owner: Hunter Campbell *Residential Alteration (House was gutted and restored with new electrical, plumbing, HVAC, drywall, new roof, vinyl siding (home + garage), new doors, and 1 new window)*	 (Google Maps August 2019)	 (Staff Photo October 2023)
☐ Vote 1418 Crestwood Dr Owner: Laura M Potie *Residential Alteration (Home office added attached, off the back of the garage. Replaced 16 windows and siding)*	 (Google Maps 2014)	 (Google Maps 2023)

2023 Community Improvement Award Nominees
Commercial Category

☑ Please vote for one winner

	BEFORE	AFTER
☐ Vote 1224 S Mission St Owner: SVC ABS LLC *Commercial alteration (Repaint, awnings, and signs. Interior demo of dining room, new restroom and dining room buildout)*	 (Google Maps 2019)	 (Staff Photo January 2024)
☐ Vote 210 W Pickard St AB STE 212 Owner: Stash Ventures LLC *Commercial alteration (Renovation of space for marihuana dispensary)*	 (Staff Photo April 2023)	 (Staff Photo January 2024)
☐ Vote 502 N Mission St Owner: 502 N Mission LLC *Commercial alteration (Interior renovation & exterior work)*	 (Staff Photo October 2022)	 (Staff Photo January 2024)

2023 COMMUNITY IMPROVEMENT AWARDS

Mt. Pleasant
meet here

Picture by: Dan Gaken

Commercial Category

502 N Mission St
The Woods
Marijuana Dispensary
502 N Mission LLC

Mt. Pleasant

meet here

Residential Category

111 Russell
Charles & Leigh Crespy

Mt. Pleasant

[meet here]

Picture by: Dan Gaken

Residential Category

207 N Fancher
Hunter Campbell

Mt. Pleasant

meet here

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Fire and EMS Analysis

City of Mount Pleasant, MI

Joe Pozzo, Senior Manager for Fire and EMS

Jason Brady, Senior Associate

Center for Public Safety Management

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- Strategic and Public Safety Master Planning
- Technical analysis for Police, Fire, EMS, and 911 Centers
- Public Safety Chief Selection
- Conducted more than 400 studies in 46 states and Canada
- Fire and EMS team with hundreds of years experience as practitioners, middle managers and senior administrators

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Methodology

- Data Analysis
  - ✓Response Time, Workload, Resiliency, Ambulance Transport
- Interviews
  - ✓Virtual, On-Site
- Document Review
  - ✓Department and City Provided
- National Benchmarking
  - ✓National Fire Protection Association
  - ✓Insurance Services Organization
  - ✓CAAS Ambulance Accreditation

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Overall Impressions

- The MPFD overall, provides quality fire, first response EMS, and related services. The MPFD staff are professional and dedicated to their mission.
- MMR overall is a quality organization and meets the current level of service contractual response time performance standard in Mt. Pleasant.
- CPSM recommendations provide alternatives for consideration and a sustainable MPFD, as well as opportunities for improvement.

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MPFD Workload

Call Type	Total Calls	Calls per Day
Medical and other	298	0.8
MVA	99	0.3
EMS subtotal	**397**	**1.1**
False alarm	212	0.6
Good intent	19	0.1
Hazard	148	0.4
Outside fire	28	0.1
Public service	85	0.2
Structure fire	36	0.1
Technical rescue	11	0.0
Fire subtotal	**539**	**1.5**
Canceled	62	0.2
Mutual aid	8	0.0
Total	**1,006**	**2.8**

- 39.5 percent of the Fire and EMS calls are EMS related.
- Motor vehicle accidents make up 25 percent of EMS related calls.

- 54 percent of the Fire and EMS calls are Fire related.
- 6 percent of Fire and EMS calls are cancelled prior to responding or while enroute.
- Hazard, Structure and Outside fire calls make up 39 percent of Fire calls.
- False alarms make up 39 percent of fire related calls.
- Public Service and Good Intent calls make up 19 percent of fire related calls.

Area	Calls	Percent Calls	Runs	Runs Per Day	Percent Work
Mt. Pleasant	612	60.8	750	2.1	59.7
Charter Twp of Union	386	38.4	492	1.3	37.1
Outside Service Area	8	0.8	21	0.1	3.2
Total	**1,006**	**100.0**	**1,263**	**3.5**	**100.0**

The largest percentage of MPFD unit responses are in the Mt. Pleasant zone.

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Key Discussion Area

EMS

EMS ground transport provided by Mobile Medical Response (MMR).

MMR is currently accredited by:

- The National Academies of Emergency Dispatch
- The Commission on Accreditation of Ambulance Services
- The Commission on the Accreditation of Allied Health Education Programs

Overall – MMR is a quality organization

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MMR Workload

Run Type	Total Runs	Percent of Total	Arriving Runs	Arriving Rate	Transport Runs	Transport Rate
Breathing difficulty	465	9.8	444	95.5	346	74.4
Cardiac and stroke	543	11.5	518	95.4	374	68.9
Fall and injury	1,043	22.1	967	92.7	562	53.9
Illness and other	1,439	30.4	1,335	92.8	986	68.5
MVA	229	4.8	205	89.5	110	48.0
Overdose and psychiatric	458	9.7	369	80.6	297	64.8
Seizure and unconsciousness	552	11.7	512	92.8	377	68.3
Total	**4,729**	**100.0**	**4,350**	**92.0**	**3,052**	**64.5**

92% of all runs had an arriving MMR unit. Average of 12/day.

64.5% of all runs converted to a transport. Average of 8.4/day.

Falls and Injury/Illness and Other make up the highest percentage of MMR runs. 52%

MVAs had the lowest transport rate. 48%

Location	Run Count	Percent Runs	Runs Per Day
Mt. Pleasant	3,046	64.4	8.3
Union Township	1,683	35.6	4.6
Total	**4,729**	**100.0**	**13.0**

The largest percentage of MMR unit responses are in the Mt. Pleasant zone.

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Key Discussion Area

EMS

- CPSM assessed MMR's' Medical Direction program/practices are consistent with current EMS best practices for EMS Physician engagement, clinical oversight, and program development.
- CPSM assesses at the time of our review that MMR's training program ensures regular, routine, and validation-based training. The standards from MMR's QA/QI review and evaluation-led training are consistent with industry practices and are aligned with CAAS accreditation standards.
- CPSM assessed MMR's' response times are within the service agreement parameters for Mt. Pleasant for all calls.

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Key Discussion Area

Fleet

Current Fleet:

3 Engines (2009, 2011, 2020)

1 Aerial Ladder: (1997)

1 Rescue: (1996)

1 Water Tender (2002)

National Standard (NFPA 1901)

Serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them.

Provides safer response vehicles for those providing emergency services within the community, as well those "sharing the road" with these responders.

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Key Discussion Area

Fleet Recommendations

- ❖ Develop, over a one-year period, a fire apparatus replacement plan that follows apparatus recommendations in accordance with NFPA 1901:
- ✓ First-line apparatus should not exceed 15 years of service on the front line. Once an apparatus reaches this age, consideration for a Level 1 refurbishing if applicable.
- ✓ Apparatus in active/reserve status which is between 20 and 25 years old: should comply with NFPA 1901 and undergo a Level 1 refurbishing as an immediate planning objective if the department plans to continue to use this apparatus.
- ✓ All apparatus at the 25-year-old mark should be considered for replacement. Apparatus greater than 25 years old should be removed from service.

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Key Discussion Area

Fleet Recommendations

- Combining apparatus types (2 types into 1) such as one Engine and the Rescue into a Rescue Engine. This would avail a multi-purpose apparatus capable of firefighting and technical rescue (a common practice across the country, particularly where staffing is limited).
- Another alternative is combining one Engine with the Water Tender into a Tender-Engine. This would avail a multi-purpose apparatus capable of initial firefighting with a large water tank and that of a tender, capable of shuttling water to the fire (again, a common practice across the country, particularly where staffing is limited).

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Key Discussion Area

Training & Education

The MPFD has a planned training program and there exists a dedicated effort focused on a wide array of training activities.

The 2023 ISO-PPC report however exposes training deficiencies that include:

- ✓ Live firefighting training at a training facility (18-hours/year for every firefighter)
- ✓ Company training (16-hours/month in structural firefighting).

Both training components represent core subject matter (instructional and hands-on training) for fire departments.

Every effort should be made to make completion of required and period training an MPFD priority.

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Key Discussion Area

Training & Education Recommendations

- The MPFD should make it a priority to ensure evening and weekend training and daily in-station training occurs as scheduled and/or required.
- The MPFD should continue to develop and budget for its fire officer training and development program.
- The MPFD should develop a plan to provide all personnel with mandatory high-intensity training on subjects such as periodic live fire training on at least a semi-annual basis and live fire facility training.
- The MPFD should continue to support and budget for external training opportunities at the state and national level (National Fire Academy and Emergency Management Institute).

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Key Discussion Area

Level of Service

- The MPFD as a career, paid-on-call agency aligns with NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments*, 2020 edition.
- NFPA 1720 establishes the minimum response staffing for a predominately volunteer department for low-hazard structural firefighting incidents (to include out buildings and up to a 2,000 square-foot, one- to two-story, single-family dwelling without a basement and no exposures) for specific demand zones.

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Key Discussion Area

Level of Service
NFPA 1720
Response Goals

Demand Zone	Demographics	Minimum Staff to Respond to Scene*	Response Time Standard to Collect Minimum Staff
Urban Area	>1000 people/mi²	15	Within 9 minutes 90 percent of the time
Suburban Area	500-1000 people/mi²	10	Within 10 minutes 80 percent of the time
Rural Area	<500 people/mi²	6	Within 14 minutes 80 percent of the time
Remote Area	Travel Distance ≥ 8 miles	4	Directly dependent on travel distance, determined by AHJ, 90 percent of the time

Note: *Minimum staff responding includes automatic and mutual aid. Minimum staff responding to scene by apparatus and personal owned vehicle.

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Key Discussion Area

Level of Service
MPFD Operational Staffing

- ❖ Three full time career positions per shift (1 Sgt.; 1 Equipment Operator; 1 FF).

  9 FTEs

- ✓ When one of the shifts has a vacancy due to scheduled or unscheduled leave, or the position is vacant, there may be only two full time employees on duty.
- ✓ On weekdays and during the daytime work hours, at least one of the FFs is away from the station in a light MPFD vehicle conducting rental property inspections.
- ❖ Budgeted for up to 16 Paid-On-Call Positions

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Key Discussion Area

Level of Service

Overall, what needs to be achieved for a safe and effective fire unit response:

- ✓ A daily fire staffing of two MPFD personnel (full time or a combination of full time, paid on call, and part time) in the station, so there are no single firefighter responses on the fire apparatus, and for a safe and effective operational response to building fires.
- ✓ Goal: fulfill the minimum response of personnel as outlined in NFPA 1720 in urban (15 firefighters), suburban (10 firefighters), and rural areas (6 firefighters) of the MPFD response district.

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Key Discussion Area

Level of Service
Alternatives/Recommendations

- Utilize the existing paid-on-call budget: establish a paid-on-premises program.
- Utilize the existing paid-on-call budget: establish six part-time firefighter positions.
- Consider hiring a rental inspector to perform the rental inspection duties to maintain a minimum of two FFs on duty in the station.

  Option-Rental inspector can be trained in firefighting and medical first response to assist with responses as needed.

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Key Discussion Area

Level of Service
Alternatives/Recommendations

- ❖ Consider offering street department, utilities, recreation, code enforcement, and engineering staff who have assigned a city vehicles, an opportunity to receive firefighter and medical first responder training (or training as designated by the Fire Chief).
- ✓ These staff members would respond to designated emergency incidents, during the workday, and assist the MPFD mitigate city emergencies.

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Key Discussion Area

Level of Service
Alternatives/Recommendations

- ❖ CPSM recommends the MPFD continue with reciprocal automatic and mutual aid agreements as they provide a valuable boost to assembling an Effective Response Force for structural fires and multi-unit responses, and as well improve the overall resiliency of the MPFD.

- ✓ Work with regional Fire Chiefs to increase response resources system-wide to fire responses that align more closely with the NFPA 1720 Effective Response Force standards.

  Tribal FD

  Shepheard Tri-Township FD

  Deerfield FD

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Key Discussion Area

Level of Service
Alternatives/Recommendations

- ❖ CPSM recommends the City more formally implement the Public Safety Administration model that clearly defines the Public Safety Director and the Police and Fire Administrators.
- ✓ CPSM further recommends the City consider adopting a Public Safety Officer model either in full or in a hybrid model that considers the greater efficiencies of a Public Safety Officer model is realized when police officers are trained and equipped to respond to fire and EMS incidents while they are working in their assigned patrol districts.

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Key Discussion Area

Level of Service
Alternatives/Recommendations
MPFD Staffing Models

- ❖ 12-hour shifts, which includes a four-group system where a single group works a 12-hour shift day shift and is relieved by another group that works a 12-hour night shift.
- ✓ To maintain a minimum of three full time career staff on duty per group:

  This model would take 12 full time positions and/or a combination of fulltime and scheduled paid on call or part time personnel. (8 FTEs required for 2 minimum on duty).

  This schedule is designed to keep full time firefighters below the 53-hour Fair Labor Standards Act (FLSA) workweek standard.

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Key Discussion Area

Level of Service
Alternatives/Recommendations

- ❖ 10-14 hour shifts, which also includes a four-group system where a single group works a 10-hour shift day shift and is relieved by another group that works a 14-hour night shift.
- ✓ To maintain a minimum of three full time career staff on duty per group, this model would take:

  12 full time positions and/or a combination of fulltime and scheduled paid on call or part time personnel. (8 FTEs required for 2 minimum on duty).

  This schedule generally designed to keep full time firefighters below the 53-hour Fair Labor Standards Act (FLSA) workweek standard but may not on certain weeks.

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Additional Recommendations

CPSM recommends the MPFD develop a three to five-year strategic plan that outlines the mission, vision, and values of the department, and that includes near, mid, and longer-term organizational goals.

CPSM recommends the MPFD develop and implement a performance measurement reporting system that includes input, efficiency, and productivity measures in addition to the standard workload and output measures the department utilizes in their current budget indicator reporting system.

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Additional Recommendations

CPSM recommends the MPFD develop a management process that ensures Standard Operating Procedures and Policies and Procedures remain current, represent a contemporary fire department, reflect current best practices, and consider all internal and external forces and relationships prior to implementation.

CPSM recommends MPFD develop a health, safety, and wellness committee, and further develop a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition.*

Additional Recommendations

CPSM recommends the MPFD continue to respond to high acuity EMS calls as established through the Medical Priority Dispatch protocols as this first tier EMS response is a best practice.

CPSM recommends the city actively review tri-annual performance benchmarks as presented by MMR to ensure the Isabella County Ambulance Service Agreement performance benchmarks are being met in the city.

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Additional Recommendations

Should MMR response times degrade, the City may address MMR response time deficiencies through discussion that may include:

Peak Hour Unit

Location-Specific Strategies

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End of Presentation

Questions and Discussions

CENTER FOR PUBLIC SAFETY MANAGEMENT, LLC

Operational and Administrative Analysis

Mt. Pleasant Fire Department

Mt. Pleasant, MI

Draft Final Report-November 2023

CPSM®

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THE ASSOCIATION & THE COMPANY

The International City/County Management Association is a 109-year old, nonprofit professional association of local government administrators and managers, with approximately 13,000 members located in 32 countries.

Since its inception in 1914, ICMA has been dedicated to assisting local governments and their managers in providing services to its citizens in an efficient and effective manner. ICMA advances the knowledge of local government best practices with its website (www.icma.org), publications, research, professional development, and membership. The ICMA Center for Public Safety Management (ICMA/CPSM) was launched by ICMA to provide support to local governments in the areas of police, fire, and emergency medical services.

ICMA also represents local governments at the federal level and has been involved in numerous projects with the Department of Justice and the Department of Homeland Security.

In 2014, as part of a restructuring at ICMA, the Center for Public Safety Management (CPSM) was spun out as a separate company. It is now the exclusive provider of public safety technical assistance for ICMA. CPSM provides training and research for the Association's members and represents ICMA in its dealings with the federal government and other public safety professional associations such as CALEA, PERF, IACP, IFCA, IPMA-HR, DOJ, BJA, COPS, NFPA, and others.

The Center for Public Safety Management, LLC, maintains the same team of individuals performing the same level of service as when it was a component of ICMA. CPSM's local government technical assistance experience includes workload and deployment analysis using our unique methodology and subject matter experts to examine department organizational structure and culture, identify workload and staffing needs, and align department operations with industry best practices. We have conducted 341 such studies in 42 states and provinces and 246 communities ranging in population from 8,000 (Boone, Iowa) to 800,000 (Indianapolis, Ind.).

Thomas Wieczorek is the Director of the Center for Public Safety Management. Leonard Matarese serves as the Director of Research & Program Development. Dr. Dov Chelst is the Director of Quantitative Analysis.

CENTER FOR PUBLIC SAFETY MANAGEMENT PROJECT CONTRIBUTORS

Thomas J. Wieczorek, Director
Leonard A. Matarese, Director, Research & Project Development
Dov Chelst, Ph.D. Director of Quantitative Analysis
Joseph E. Pozzo, Senior Manager for Fire and EMS
Jason Brady, Senior Associate-EMS
Rondall Early, Associate-Fire and EMS
Stephanie Williams, GIS Specialist
Xianfeng Li, Data Analyst

CONTENTS

§§§

SECTION 1. INTRODUCTION

The City of Mt. Pleasant contracted with the Center for Public Safety Management LLC (CPSM) to complete an analysis of the city's fire department.

The service demands and challenges generated by the community are numerous for the fire department and include fire protection; EMS first response; technical rescue; severe weather; density challenges; a state university, transportation emergencies to include vehicle traffic, the potential for future commuter rail; brush fires; and other non-emergency responses typical of urban/suburban/rural fire departments.

A significant component of this report is the completion of an organizational analysis that includes the organizational structure; training and education; strategic planning and performance measures; health safety and wellness of staff; and operational staffing. The organizational analysis and recommendations are focused on organizational improvement and sustainability of personnel.

Another significant component of the analysis is the risk profile of the community, which contemplates many factors that cause, create, facilitate, extend, and enhance risk in and to a community. The risk profile is an important component of this report as it links directly to staffing and deployment of fire and EMS assets in the community.

The response time and staffing components discussion of this report are designed to examine the current level of service provided by the Mt. Pleasant Fire Department (MPFD) compared to national best practices. As well, these components provide incident data and relevant information to be utilized for future planning and self-review of service levels for continued improvement. This analysis is intended to help the department meet community expectations and mitigate emergencies effectively and efficiently. CPSM has provided several operational staffing alternatives and recommendations utilizing current department funding.

Other significant components of this report are an analysis of the current deployment of resources and the performance of these resources in terms of response times and the MPFD fire management zones, which include the city and the Charter Township of Union; a comprehensive review of the current ISO Public Protection Classification report; current staffing levels and patterns; department resiliency (ability to handle more than one incident); critical tasking elements for specific incident responses and assembling an effective response force; community risk reduction; and department infrastructure (fleet and facility).

Based upon CPSM's detailed assessment of the MPFD, it is our conclusion that the department, overall, provides quality fire, EMS, and rescue services. The MPFD staff are professional and dedicated to the mission of the department. This was apparent during our discussions as staff were quite focused on creating a positive future for the agency.

This report also contains a series of observations and planning objectives and recommendations. These are intended to help the MPFD deliver services more efficiently and effectively. Recommendations and considerations for continuous improvement of services are presented here. CPSM recognizes there may be recommendations and considerations that may need to be budgeted and/or bargained, or for which processes must be developed prior to implementation.

Recommendations appear in the order they appear in the report.

Analysis Methodology

Data Analysis

The CPSM Fire and EMS Team used numerous sources of data to support our conclusions and recommendations for the MPFD. Information was obtained from the city and department along with numerous sources of internal information garnered from a CPSM document/information request. Internal sources included data from the computer-aided dispatch (CAD) system for response time and workload information, and the department's National Fire Incident Reporting System (NFIRS) records management system for calls for service.

Stakeholder Interviews

This study relied extensively on stakeholder interviews and interaction with department leadership and the city. On-site and in-person interviews and virtual meetings were conducted with the senior department leadership, and the City Manager and Public Safety Director (Police Chief).

Document Review

CPSM Fire Team consultants were furnished with numerous reports and summary documents by the MPFD. Information on department planning; staffing and deployment of resources; mutual aid; policies and procedures; community risk, fire inspections, public education; fleet and facilities; training; and additional performance information were reviewed by fire project team staff. Follow-up phone calls, emails and virtual meetings were used to clarify information as needed.

Operational/Administrative Analysis

Over the course of the analysis, numerous analyses were conducted. These included analysis of emergency operations; department leadership; community risk reduction; fleet schedules and overall facility usefulness in a contemporary fire department; administrative functions; deployment of apparatus from a coverage perspective as benchmarked against national standards; and operational staffing benchmarked against national standards as it relates to assembling an effective response force. The CPSM Fire Team engaged all facets of department operations from a ground floor perspective and as well from a leadership and management perspective.

Staffing Analysis

In virtually all CPSM fire studies, we are asked to identify appropriate staffing and resource deployment levels. This is the case in this analysis as well. In this report we discuss operational workload; critical tasking; assembling an effective response force; operational deployment, current and future station locations, and the feasibility of additional staffing assets to improve response coverage; and other factors to be considered in establishing appropriate staffing levels. Staffing recommendations are based upon our comprehensive evaluation of all relevant factors and are benchmarked against national standards such as the National Fire Protection Association (NFPA) 1720 Standard, ISO Public Protection Classification rating system, and the Center for Public Safety Excellence, Standards of Cover.

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Recommendations

1. CPSM recommends deficiencies in the 2023 ISO-PPC report should be included in any planning the city and MPFD conducts in the near and mid-terms. This should include planning to improve training deficits, fire hydrant inspection and flow testing, and deployment of resources.
2. The MPFD should make it a priority to ensure evening and weekend training and daily in-station training occurs as scheduled and/or required.
3. The MPFD should continue to develop and budget for its fire officer training and development program. To further enhance the program the department should consider components that are competency-based on National Fire Protection Association (NFPA), International Association of Fire Chiefs (IAFC), and International Fire Service Training Association (IFSTA) standards, and that focus on contemporary fire service issues including community fire protection and emergency services delivery approaches; fire prevention practices; firefighter safety and risk management; employee relations; reviewing, approving, or preparing technical documents and specifications; departmental policies; standard operating procedures; formal internal communications; improving organizational performance through process improvement and best practices initiatives; and having a working knowledge of information management and technology systems.
4. The MPFD should develop a plan to provide all personnel with mandatory high-intensity training on subjects such as periodic live fire training on at least a semi-annual basis; live fire facility training to include fireground basics such as hose and ladder evolutions, forcible entry, ventilation, search and rescue, and vehicle extrication. This should include practical skills competency and proficiency evaluations (non-punitive) as part of the department's comprehensive fire training program.
5. The MPFD should continue to support and budget for external training opportunities at the state and national level (National Fire Academy and Emergency Management Institute).
6. CPSM recommends the MPFD, along with internal and external stakeholder input develop a three-five year strategic plan that outlines the mission, vision, and values of the department, and that includes near, mid, and longer term organizational goals. Ideally, this plan would be developed in the context of a clear vision of what the department will look like in the future.
7. CPSM recommends the MPFD develop and implement a performance measurement reporting system that includes input, efficiency, and productivity measures in addition to the standard workload and output measures the department utilizes in their current budget indicator reporting system.
8. CPSM recommends the MPFD develop a management process that ensures Standard Operating Procedures and Policies and Procedures remain current, represent a contemporary fire department, reflect current best practices, and consider all internal and external forces and relationships prior to implementation.
9. CPSM recommends MPFD develop a health, safety, and wellness committee, and further develop a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition.* CPSM further recommends the Fire Chief have department health, safety, and wellness oversight as the department Health and Safety Officer.

Emergency Medical Services

10. Overall, and based on our assessment of MMR, CPSM does not recommend a change in EMS ground transport services. Further, CPSM does not recommend the city or the township or both together implement a dedicated municipal EMS service, as currently neither the city nor the township bear a cost for providing EMS transport, and that this service will add additional annualized costs to each with no guarantee of full revenue cost recovery.
11. Based on response times in the city by MPFD to EMS calls (8.9 minutes), which shows the MPFD will likely arrive prior to MMR on EMS calls, CPSM does recommend the MPFD continue to respond to high acuity EMS calls as established through the Medical Priority Dispatch System, ProQA protocols, which are endorsed by the Isabella County Medical Authority, as this first tier EMS response is a best practice.
    - Current MMR service agreement response time requirements for Zone A (life threatening calls): 10.8 minutes 80 percent of the time.
        - Mt. Pleasant 80th percentile MMR response time: 10.2 minutes (all calls).
        - Charter Township of Union 80th percentile MMR response time: 11.8 minutes (all calls).

    Any of the call types MMR is dispatched to can be initially classified as life-threatening or upgraded to life threatening at any time after dispatch.

12. CPSM recommends the city and township actively review tri-annual performance benchmarks as presented by MMR to ensure the Isabella County Ambulance Service Agreement performance benchmarks are being met in the city and the township pursuant to the agreement. If the performance benchmarks are not being met, the city and/or township should meet with county officials to discuss improvement with MMR that has a goal of sustaining the ambulance service agreement performance standards for the respective jurisdictions.
13. CPSM also recommends, should MMR response times in Mt. Pleasant degrade, and to address response time in the Charter Township of Union, the City and/or the Township may address MMR response time deficiencies through discussion that may include:
    - Peak Hour Preparedness:
        - Identify and analyze the peak hours with the highest number of runs and ensure that MMR resources are adequately distributed in Mt. Pleasant and the Charter Township of Union during those times to handle increased demand. In Mt. Pleasant and the Township these times are generally 9:00 am to 7:00 pm (highest number of calls on average).
    - Location-Specific Strategies:
        - Assess the factors contributing to variations in response times between Mt. Pleasant and the Charter Township of Union. MMR could consider location-specific ambulance staging strategies to optimize response efficiency.

An alternative approach the city and the township together or separately may consider is to solicit private ambulance ground transport services through a Request for Proposal (RFP) process. CPSM recommends if this alternative is chosen, the RFP specifies the terms and conditions for the type of ground transport service sought, that being either a Level of Effort or Level of Performance as outlined next:

- A "***Level of Effort***" agreement describes the scope of work in general terms and requires the contractor to provide a specified level of effort (number of hours and/or number of units in the response area) over a stated period of time.

- A ***"Level of Performance"*** agreement specifies desired performance levels for key response time and/or clinical metrics. For example, when mutually agreed upon between both parties could include a specific number of ambulances and performance level indicators (i.e., response time metrics, level of care providers (ALS or BLS), quality improvement/quality insurance metrics involving patient care outcomes, community paramedicine etc.).

14. CPSM recommends the MPFD and the city develop, over a one-year period, a fire apparatus replacement plan that follows apparatus age recommendations in accordance with NFPA 1901 standard, *Standard for Automotive Fire Apparatus*.

    Planning objectives should include to the extent possible and based on funding:

    - First-line apparatus should not exceed 15 years of service on the front line. Once an apparatus reaches this age, it should undergo a Level 1 refurbishing in accordance with NFPA 1912, *Standard for Fire Apparatus Refurbishing* (current standard) as a first alternative, or replacement if maintenance records and wear and tear warrant replacement.

    - Apparatus in active/reserve status which is between 20 and 25 years old should comply with NFPA 1901 and undergo a Level 1 refurbishing in accordance with NFPA 1912 as an immediate planning objective if the department plans to continue to use this apparatus. All apparatus at the 25-year-old mark should be considered for replacement. Apparatus greater than 25 years old should be removed from service.

    - Combining apparatus types (2 types into1) such as one engine and the rescue into a Rescue Engine. This would avail a multi-purpose apparatus capable of firefighting and technical rescue (a common practice across the country, particularly where staffing is limited). Another alternative is combining one engine with the water tender into a Tender-Engine. This would avail a multi-purpose apparatus capable of initial firefighting with a large water tank and that of a tender, capable of shuttling water to the fire (again, a common practice across the country, particularly where staffing is limited).

    - Apparatus components which are either fixed or portable and which require annual testing—fire pumps, aerial ladder and aerial ladder assemblies, ground ladders, self-contained breathing apparatus to include personnel fit-testing, and fire hose—should be tested in accordance with manufacturer and industry specifications and standards, and proper records maintained at the department, the city and with the vendor.

Staffing Alternatives and Recommendations

There are several methods a combination fire department can consider and implement to ensure safe and effective response, while maintaining an efficient budget and effective service to the end user of the fire department response system. *Overall, what needs to be achieved for a safe and effective fire unit response - is a daily fire staffing of two MPFD personnel (full time or a combination of full time, paid on call, and part time) in the station, so there are no single firefighter responses on the fire apparatus, and for a safe and effective operational response to building fires - fulfilling the minimum response of personnel as outlined in NFPA 1720 in urban (15 firefighters), suburban (10 firefighters), and rural areas (6 firefighters) of the MPFD response district.* For the MPFD, this may include:

15. Utilize the existing paid-on-call budget and establish a paid-on-premises program where paid-on-call personnel can sign-up for 4, 8, or 12 hour blocks and receive a stipend that correlates to the paid-on-premises block of time. Ideally these assignments will cover career vacancies created by scheduled or unscheduled leave first. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
16. Utilize the existing paid-on-call budget and establish a paid-on-premises program where paid-on-call personnel are assigned 12 hour blocks (nights and weekends) and receive a stipend that correlates to the paid-on-premises block of time. Ideally these assignments will cover career vacancies created by scheduled or unscheduled leave first. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
17. The MPFD should continue to develop aggressive recruitment strategies for paid-on-call personnel. This may include working with and obtaining resources from the National Volunteer Fire Council and applying for a federal grant through FEMA's Assistance to Firefighters Grants program for paid-on-call/volunteer firefighter recruitment and retention funds.
18. Utilize the existing paid-on-call budget and establish six part-time firefighter positions. Under this program, part-time personnel would be required to work a minimum number of hours each month to cover career vacancies created by scheduled or unscheduled leave to maintain the minimum daily staffing of three. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
19. As the rental housing inspection program is demanding on the time of career shift staff, and as there are times during the workweek (Monday-Friday) and workday (8:00 am-6:00 pm) where only one career staff remains in the station for response to calls for service, the city and the MPFD should consider hiring a rental inspector to perform the inspection duties of the rental inspection program. This potentially may be a part-time position 24-32/hours/week. Potentially there may be room in the paid-on-call personnel budget to shift monies to fund this position. CPSM further recommends this position be trained in firefighting and medical first response and be available during the workday to respond to designated emergency responses such as structural fires or other multi-unit responses as designated by the Fire Chief. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
20. As MPFD calls for service are higher between the hours of 9:00 am and 8:00 pm, and peak at the 1:00 pm, 3:00 pm, 5:00 pm and 6:00 pm hours, the city, the township, and the MPFD should consider offering street department, utilities, recreation, code enforcement, engineering, and the like, who are out and about in the city and township during the normal workday and are assigned a city or township vehicle, an opportunity to receive firefighter and medical first responder training (or training as designated by the Fire Chief) and then respond to designated emergency incidents, during the workday, and assist the MPFD mitigate city/township emergencies. The goal is to bolster the Effective Response Force on structure fires and designated MPFD multi-unit responses.
21. CPSM recommends the MPFD, to the extent possible and if practical depending on available automatic and mutual aid resources, work with regional Fire Chiefs to increase response resources system-wide to fire responses that align more closely with the NFPA 1720 Effective Response Force standards.

22. CPSM recommends the City more formally implement the Public Safety Administration model that clearly defines the Public Safety Director and the Police and Fire Administrators, and which is identified in a organizational chart. CPSM further recommends the City consider adopting a Public Safety Officer model either in full or in a hybrid model that considers the greater efficiencies of a Public Safety Officer model is realized when police officers are trained and equipped to respond to fire and EMS incidents while they are working in their assigned patrol districts, and includes:

    - Training police officers in Medical First Response only and equipping patrol vehicles with EMS first response gear to include Automatic External Defibrillators (AEDs). Then MPPD patrol units can respond to EMS calls as the first tier either with or in lieu of MPFD units. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
    - Training police officers in the firefighting discipline only and equipping each with firefighter personal protective clothing and associated gear. Then MPPD patrol units can respond to fire calls and be included in the assembling of an Effective Response Force. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
    - Training police officers in both the firefighting discipline and to the Medical Fire Responder level with issued gear and equipment as described above, and dispatch police units to either all EMS and fire calls or as necessary when there are concurrent MPFD calls in the city (when a MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two, and POC staff are not available when a fire call is dispatched.
    - Training firefighter staff in law enforcement and equipping each with required and necessary law enforcement equipment. Cross trained personnel can be used as additional backfill capacity to cover scheduled and unscheduled personnel (on their off days), and as surge capacity during special and large mass gathering events (primarily on their off days and potentially during on-shift times when POC staff is available and can be scheduled). This model may support dispatching on-duty firefighters (PSOs) to law enforcement calls as well, and in the proper response vehicle (not fire apparatus) when MPPD has concurrent calls.

In addition to the above there are additional staffing alternatives the city and MPFD may consider include:

- 12 hour shifts, which includes a four group system where a single group works a 12 hour shift day shift and is relieved by another group that works a 12 hour night shift. For example, a firefighter might work from 7:00 AM to 7:00 PM (day shift) or from 7:00 PM to 7:00 AM (night shift), depending on the group assignment. The 12 hour shift schedule is a rotating schedule the same as a 24 hour shift and requires four groups to cover all shifts continuously 365 days/year. To maintain a minimum of two full time career staff on duty per group, this would take eight full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. To maintain a minimum of three full time career staff on duty per group, this would take 12 full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. This schedule is designed to keep full time firefighters below the 53 hour Fair Labor Standards Act (FLSA) workweek standard.

- 10-14 hour shifts, which also includes a four group system where a single group works a 10 hour shift day shift and is relieved by another group that works a 14 hour night shift. For example, a firefighter might work from 7:00 AM to 5:00 PM (day shift) or from 5:00 PM to 7:00 AM (night shift), depending on the group assignment. The 10-14 hour shift schedule is a rotating schedule the same as a 24 hour shift and requires four groups to cover all shifts continuously 365 days/year. To maintain a minimum of two full time career staff on duty per group, this would take eight full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. To maintain a minimum of three full time career staff on duty per group, this would take 12 full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. This schedule generally designed to keep full time firefighters below the 53 hour Fair Labor Standards Act (FLSA) workweek standard but may not on certain weeks for groups working the 14 hour night shift, or a combination of 10 hour days and 14 hour night shifts and is dependent on the workweek pay period start and end and total hours regularly scheduled.

Factors on which these staffing alternatives and recommendations are based on include:

- Demand for all services on the MPFD (fire and EMS response; community risk reduction; rental housing inspections).
- Community risks identified in this report.
- The MPFD has only one staffed fire suppression apparatus, and mutual and automatic aid response resources have extended response times due to the location of these assets.
- NFPA 1720: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency medical Operations, and Special Operations to the Public by Volunteer (and Combination) Departments.*
- Resiliency.

  Overall, the MPFD does not have resiliency issues on the surface. Concurrent calls are infrequent, the average time on a call for the primary response engine units is below 30 minutes, the highest frequency of calls in an hour is zero, and total calls in a day is just below three, or one call every eight hours. Addtionally, and based on the response protocols as outlined in Standard Operating Procedure 1.8, there is not a resistance issue either.

  However, the MPFD' s ability to absorb multiple calls and restore response capabilities to a state of normal can be challenging at certain times such as during working structural fires and other multi-company responses (runs). Additionally, and below the surface, the ability of the MPFD to respond to multiple calls when they do occur, and to respond additional apparatus on multi-unit and working fire and rescue calls is dependent on career staffing (minimum above two when available) and the availability of the POC response force.

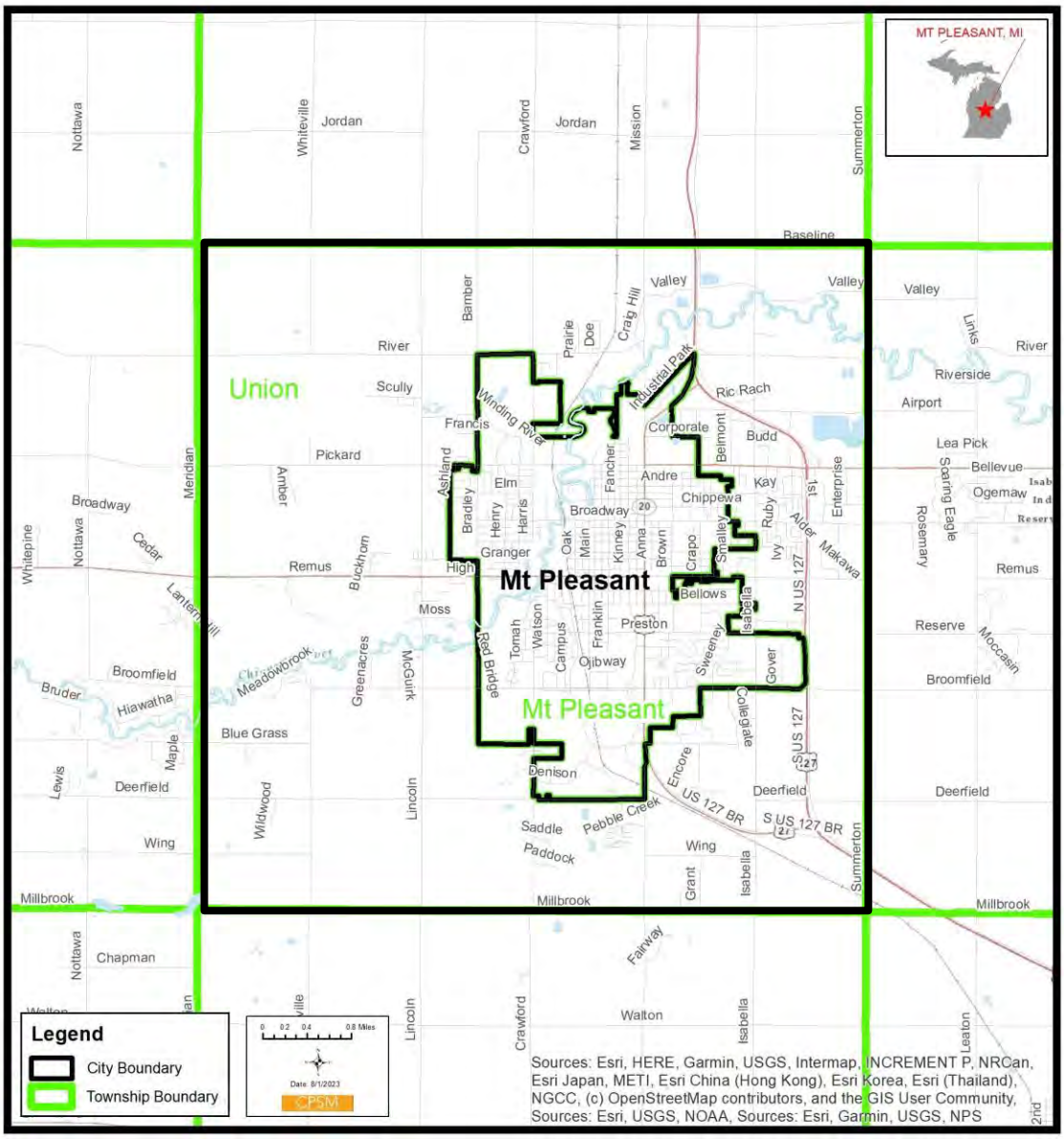
23. CPSM recommends the MPFD continue with reciprocal automatic and mutual aid agreements as they provide a valuable boost to assembling an Effective Response Force for structural fires and multi-unit responses, and as well improve the overall resiliency of the MPFD.

SECTION 2. AGENCY CHARACTERISTICS

City of Mt. Pleasant, Charter Township of Union, and MPFD Overview

The City of Mt. Pleasant is located in Isabella County, Michigan, which is located in central Michigan. Additionally, the city is located within Charter Township of Union. There are no other incorporated towns or cities within township the city is contiguous with. The total area of the city is just over 7.72 square miles, and the 2020 decennial census population is 21,688.[1]

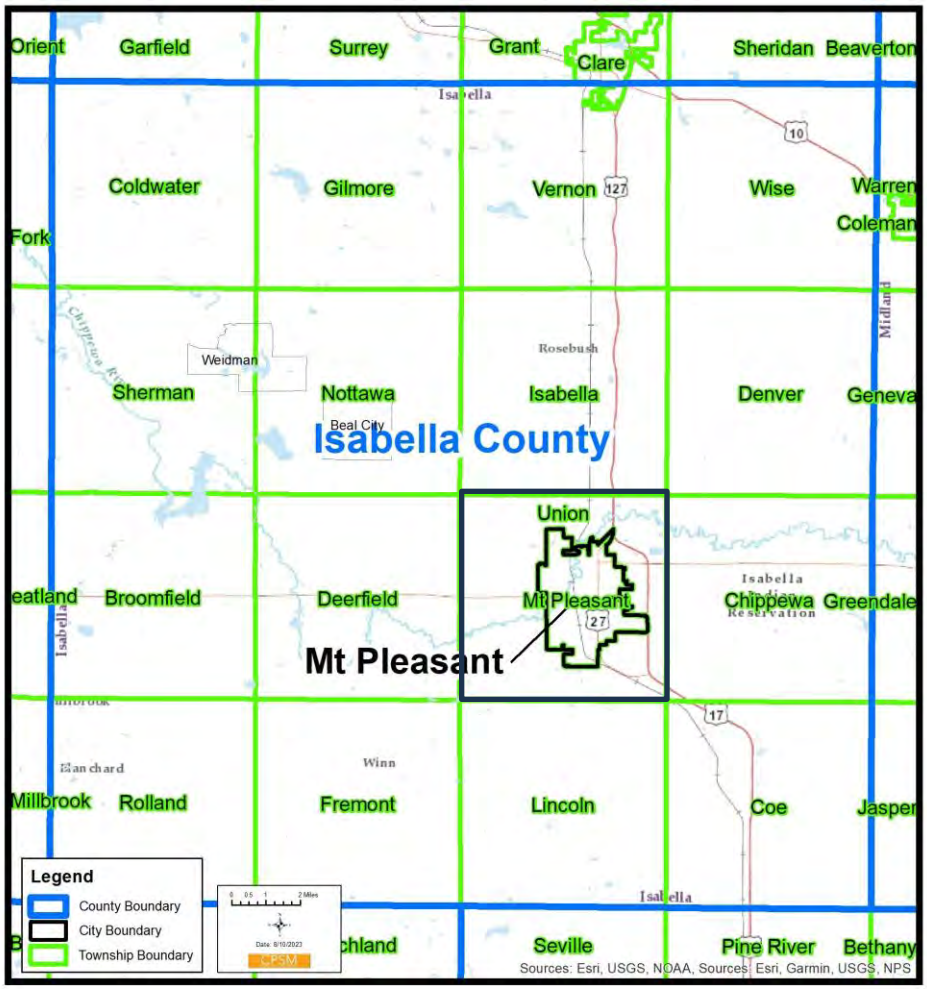
Figure 1: City of Mt. Pleasant and Surrounding Charter Township of Union



1 United States Census Bureau, Mt. Pleasant, MI.

The MPFD also provides fire protection and community risk reduction services for the Charter Township of Union. The total area of the township is just over 28 square miles, and the 2020 decennial census population is 11,699.[2] Charter Township of Union is contiguous with Isabella Township to the North, Chippewa Greendale Township to the east, Lincoln Township to the south, and Deerfield Township to the west.

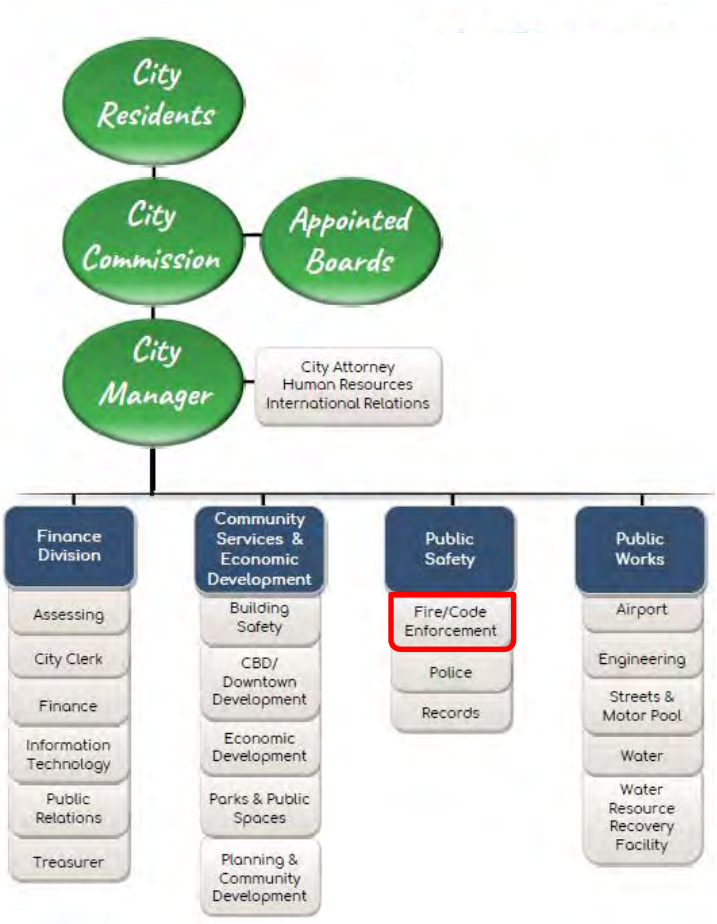
Figure 2: Charter Township of Union and Surrounding Townships



The city operates under the Commission-Manager Plan form of government. In this form of government, the City Commission serves as the legislative body for the community. An appointed City Manager is the chief administrative official for the city and is responsible for and manages the day-to-day operations of the governmental functions of the city in accordance with the City Charter, and which is also carried out through division heads and city employees. The City Manager appoints all division heads. Section 31.20 of the City Charter establishes a Division of Public Safety, which *shall be headed by the Director. He/she shall be responsible for maintenance of the public peace and safety through the prevention and suppression of fires, crime prevention and the detection and arrest persons who have violated local, state, or federal laws.*[3] The MPFD is situated in the Public Safety Division.

2. United States Census Bureau, Charter Township of Union, MI.
3. City of Mt. Pleasant, MI, Charter.

Figure 3: City of Mt. Pleasant Organizational Chart

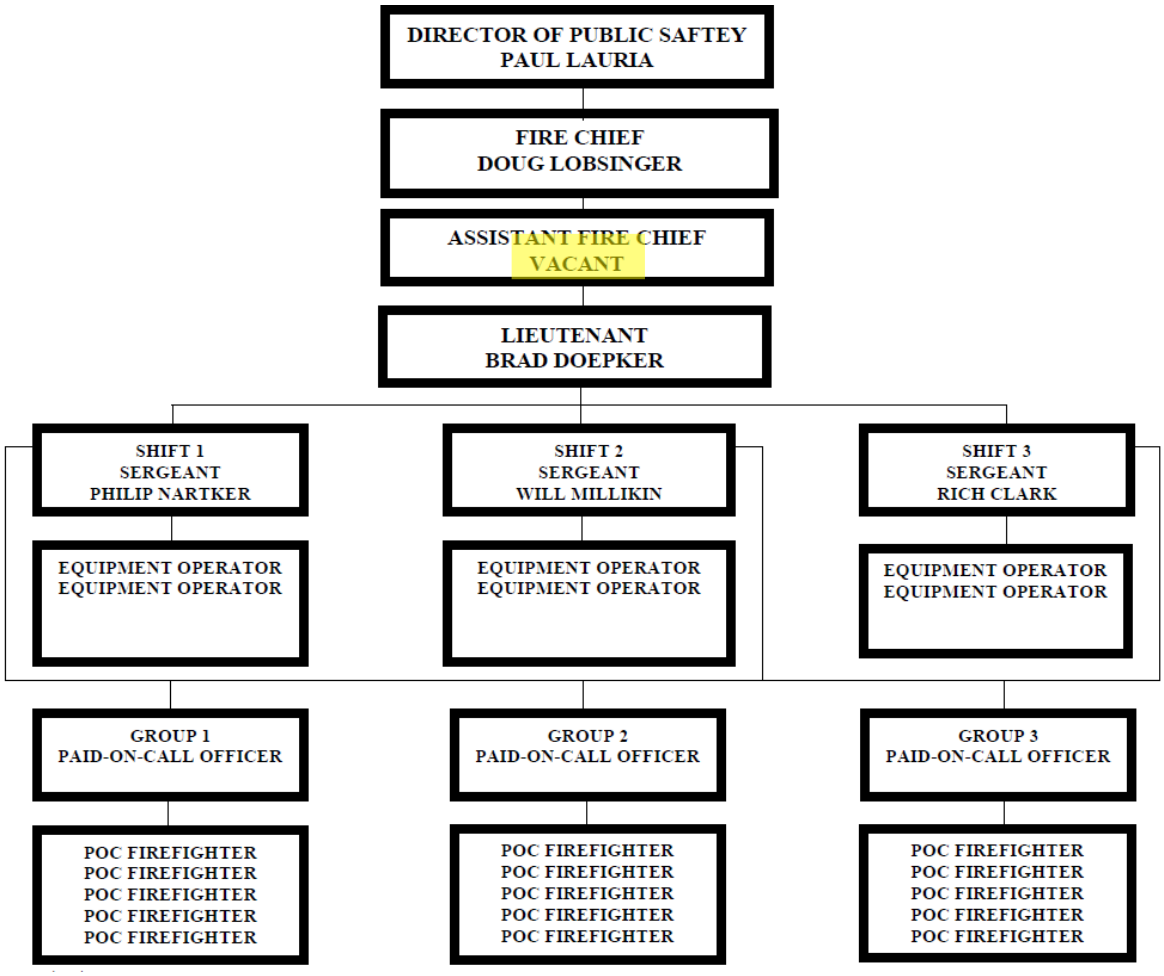


The MPFD is a combination fire department that employs full-time administrative and operational officers and paid-on-call (POC) staff, meaning these staff members are compensated only when responding to calls for service, training, and assigned administrative duties. The MPFD budgets for sixteen POC positions.

There are three groups of staffing (Groups 1, 2, 3). There is one career Sergeant (shift supervisor) and two career Equipment Operator's assigned to each group. The career groups operate on a 24/48 schedule, meaning they work 24 hours on, and then are off for 48 hours. There are nine operational career staff positions (three per group).

The POC staff are assigned to and follow the career groups, however POC staff can respond at any time. Additionally, each group has a POC officer. POC staff are in essence volunteer fire members who receive compensation for MPFD activities. Compensation consists of $32.00/hour for the first 2 hours and $20.00/hour for every hour past the initial 2 hours. The POC staff are not required to stand duty shifts on MPFD premises but rather respond to incidents or the station from home. POC firefighters are required to meet a 30 Percent response attendance annually, while POC officer are required to meet a 50 Percent response attendance annually.

Figure 4: MPFD Organizational Chart



The MPFD has three engine apparatus available to deploy, one ladder apparatus, one rescue apparatus, one water carrying tender apparatus, two squad vehicles, one command vehicle, one brush unit, and an array of specialty trailers for haz-mat and technical rescue.

Administrative, code enforcement, training and support services, and all other fire department functions operate from the city's fire station. This includes fire administrative office space.

The MPFD is led by a Fire Chief who has overall responsibility for the management and leadership of the department. The Fire Chief is assisted by an Assistant Chief who is a direct report (at the time of this report this position was vacant). The Assistant Chief's position in addition to typical fire department oversight of this level such as supervising the group sergeants and program management, also provides oversight to the city's Code Enforcement activity, Fire Marshal (Community Risk Reduction), rental housing inspection program, and department training to name a few of the essential programs this position oversees.

Programs such as training, vehicle and equipment maintenance, self-contained breathing apparatus (SCBA) maintenance, and rental inspections are supervised by the shift Sergeants with compliance currently reviewed by the Fire Chief (while the Assistant Chief's position is vacant). The Fire Chief's staff includes an Assistant Chief, Fire Marshal, and Code Enforcement staff.

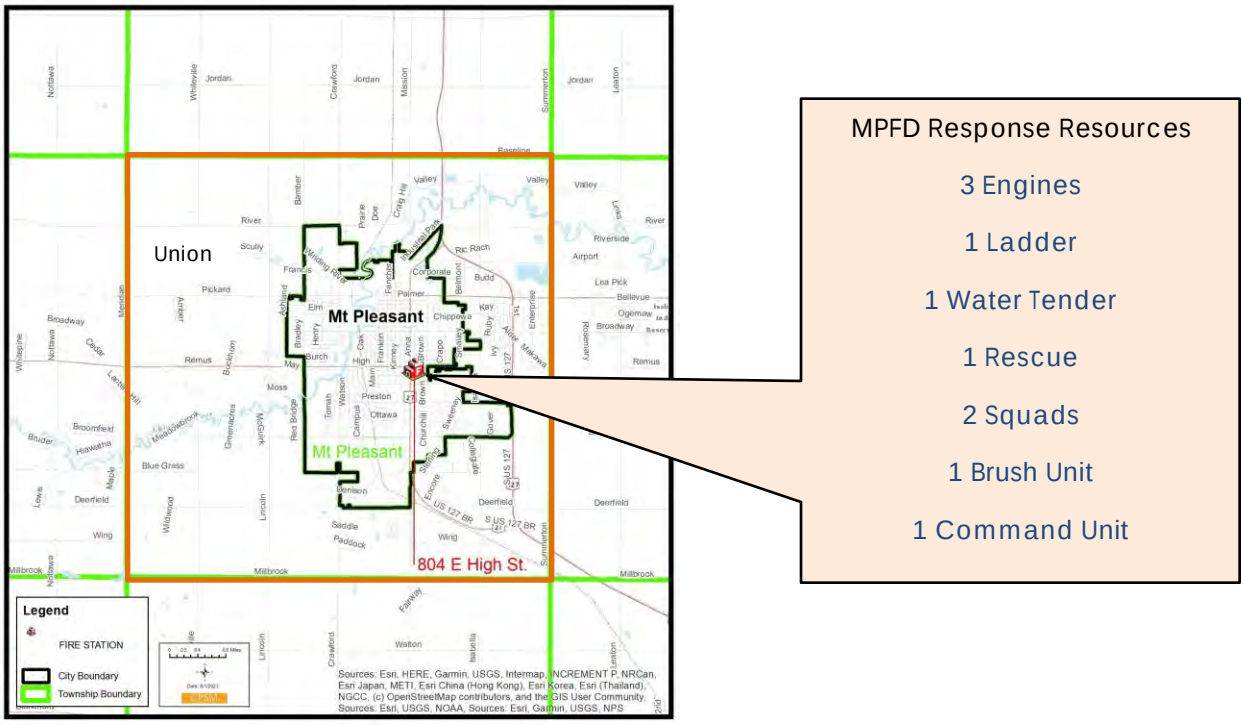
The key elements of the MPFD include:

• Fire protective services.	• EMS first-tier response (ALS level).
• Fire prevention-commercial occupancies (permit compliance).	• Fire cause and origin.
• Technical rescue.	• Hazardous materials response and mitigation.
• Community outreach and life safety education.	• Employee training and education.
• Fleet, facility, and logistical support and management.	• Special event support.
• Rental housing inspections.	• Code Enforcement

MPFD Service Area and Call Demand

The service area for the MPFD includes urban and suburban areas of the City of Mt. Pleasant and Charter Township of Union, which includes single and multi-family residential buildings of varying number of floors and heights; commercial buildings; industrial buildings; business centers; restaurants; places of worship; parks; local roads and a limited access highway; a major university that includes resident halls, learning centers/halls, administrative buildings, a typical city road network, other places of assembly and business; and rail.

Figure 5: City of Mt. Pleasant and Charter Township of Union Boundaries and Fire Station Location



On-duty career personnel typically staff and respond the first-out engine apparatus but will cross-staff other apparatus and respond the most appropriate unit as the reported incident dictates. POC staff may respond to the station and staff and respond additional units as needed. This is common in fire departments that staff and deploy such as the MPFD.

The service demands on the department generated from the service area are numerous and include EMS first response; fire suppression; technical rescue; hazardous materials; transportation emergencies, brush fires with potential interface with buildings, and other non-emergency responses typical of urban/suburban/rural fire departments.

CPSM analyzed MPFD workload for a one year period (May 1, 2022-April 30, 2023). In all, the MPFD responded to 1,006 incidents during this time period as outlined in the next Table.

Table 1: MPFD Fire Incident Workload by Call Type

Call Type	Total Calls	Calls per Day
False alarm	212	0.6
Good intent	19	0.1
Hazard	148	0.4
Outside fire	28	0.1
Public service	85	0.2
Structure fire	35	0.1
Technical rescue	11	0.0
Fire subtotal	538	1.5

53% of all calls

Table 2: MPFD EMS Workload by Call Type

Call Type	Total Calls	Calls per Day
Medical and other	298	0.8
MVA	99	0.3

41% of all calls

Included in the overall workload are cancelled calls, which are calls the MPFD was dispatched to, and were cancelled enroute or prior to responding (issue resolved and MPFD not needed). There were 62 canceled calls during the study period. Additionally, the MPFD provided 9 automatic/mutual aid responses to neighboring jurisdictions.

Emergency Medical Services ground transport for the city and township is provided by Mobile Medical Response (MMR). This service is provided through an agreement established between MMR and Isabella County. CPSM also analyzed the workload for MMR responses in the city and township as depicted in the next Table.

Table 3: MMR EMS Workload by Call Type

Run Type	Total Runs	Percent of Total
Breathing difficulty	465	9.8
Cardiac and stroke	543	11.5
Fall and injury	1,043	22.1
Illness and other	1,439	30.4
MVA	229	4.8
Overdose and psychiatric	458	9.7
Seizure and unconsciousness	552	11.7
Total	4,729	100.0

Analyzing where the Fire and EMS incidents occur, and the demand density of Fire and EMS incidents, helps to determine adequate fire management zone resource assignment and deployment. The following figures illustrate all Fire and EMS demand in the city to which the MPFD responded to. CPSM did not receive demand data information (call locations) from MMR to complete MMR demand. As illustrated, demand is highest in the central areas of the city and more developed areas of the township east of the city.

Figure 6: MPFD Fire & EMS

Fire Demand

EMS Demand

ISO-PPC Community Rating

In March 2023, the City of Mt. Pleasant received a Class 04/4X Public Protection Classification (PPC) rating from the Insurance Services Office (ISO), a subsidiary of Verisk Analytics. This classification was effective July 1, 2023, and includes the Charter Township of Union as a fire protection service area.

The Verisk hazard mitigation team collects and evaluates information from communities across the United States regarding their capabilities to provide municipal fire protection. This information is analyzed utilizing the Fire Suppression Rating System from which individual section credits and points are tabulated and a Public Protection Classification for the community is assigned. Classifications range from 1 through 10, with one being the highest rating a community can achieve.[4]

It is important to understand the PPC is not just a fire department classification, but a compilation of community services that include the fire department, the emergency communications systems, the water supply system that includes an evaluation of available water matched to the amount needed to suppress fires (referred to as fire flow), and community efforts to reduce the risk of fire, including fire prevention codes and enforcement, public fire safety education, and fire investigation programs.[5] That said, the ISO-PPC is a measure of the community's ability to prepare for and respond to building fires.

A lower PPC does not always guarantee a lower property insurance rating as many factors feed into the formulas insurance companies utilize to determine property risk rates. However, a PPC rating of 1, 2, or 3 alerts the property insurance underwriter that the service area of the fire department is well-equipped, positioned, and staffed to extinguish, mitigate, and prevent fires. Additionally, although insurance companies may use the Verisk-ISO-PPC information when deciding property insurance premiums, Verisk-ISO has nothing to do with insurance premium pricing.

A community's PPC grade depends on:

- Needed Fire Flows (building locations used to determine the theoretical amount of water necessary for fire suppression purposes).
  - The basic fire flow for Mt. Pleasant was determined to be 3500 gallons per minute (GPM).
- Emergency Communications (10 percent of the evaluation).
  - 9.85/10.00 credits earned.
- Fire Department (50 percent of the evaluation).
  - 27.97/50 credits earned.
- Water Supply (40 percent of the evaluation).
  - 29.90/40 credits earned.
- Community Risk Reduction (Additional credits received for Fire Prevention/Inspection, Public Education, and Fire Investigation activities)
  - 3.95/5.50 credits earned.

Overall, the community PPC rating yielded 67.91 earned credit points/105.50 credit points available. There was a 3.76 point diversion reduction assessed as well, which is automatically calculated based on the relative difference between the fire department and water supply scores. 60.00 points or more qualify a community for a rating of 4.

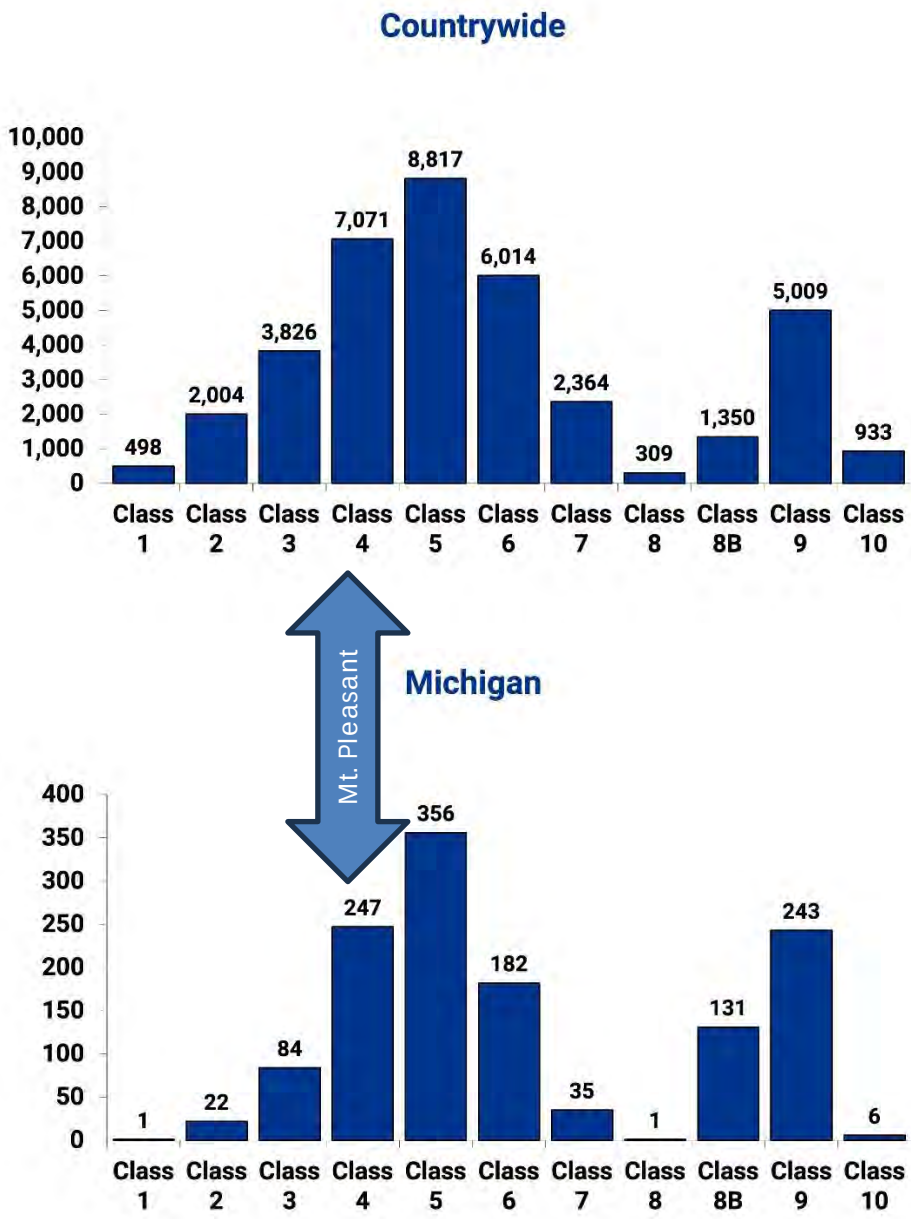
Mt. Pleasant has a double rating of 04/4X. The first number is the class applicable to properties that are within five road miles of a fire station and within 1,000 feet of a credible water source.

4. Verisk's Community Hazard Mitigation Services (isomitigation.com)
5. ibid

The second number indicates those properties within five road miles of a fire station but outside of 1,000 feet of a credible water source (built upon areas that do not have fire hydrants).

The following Figures illustrate the PPC ratings across the United States and in Michigan.

Figure 7: PPC Ratings in the United States and Michigan[6]



The next Table outlines credits earned by the MPFD.

6. https://www.isomitigation.com/ppc/program-works/facts-and-Figures-about-ppc-codes-around-the-country/

Table 4: Mt. Pleasant Earned Credit Overview

FSRS Component	Earned Credit	Credit Available
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	4.00	4
4.32. Credit for Dispatch Circuits	2.85	3
440. Credit for Emergency Communications	9.85	10
513. Credit for Engine Companies	5.48	6
523. Credit for Reserve Pumpers	0.00	0.50
532. Credit for Pump Capacity	3.00	3
549. Credit for Ladder Service	3.43	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.50
561. Credit for Deployment Analysis	5.30	10
571. Credit for Company Personnel	4.65	15
581. Credit for Training	4.11	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	27.97	50
616. Credit for Supply System	26.91	30
621. Credit for Fire Hydrants	2.99	3
631. Credit for Inspection and Flow Testing	0.00	7
640. Credit for Water Supply	29.90	40
Divergence	-3.76	-
1050. Community Risk Reduction	3.95	5.50
Total Credit	67.91	105.50

Areas of scoring that should be reviewed further internally by the city and the MPFD for improvement and to sustain/improve the current rating include:

- Credit for Deployment Analysis: #561 (5.30/10 credits).
  - This category contemplates the number and adequacy of engine and ladder companies to cover the built-upon areas of the city and fire protection service area. Credits for engine companies (#513 – 5.48/6.00) and ladder companies (#549 – 3.43/4.00) are considered in this rating section. The ISO benchmark is one engine company sighted for every 1.5 miles of built upon land, and a ladder company sighted for every 2.5 miles of built upon land. The detrmination for the Moutn Pleasant fire protection service area is made based on the percentage of built upon area is covered by existing engine companies (1.5 miles) and existing ladder companies (2.5 miles).

The next figures illusrtrates the coverage from the MPFD station for the engine company category and the ladder company category.

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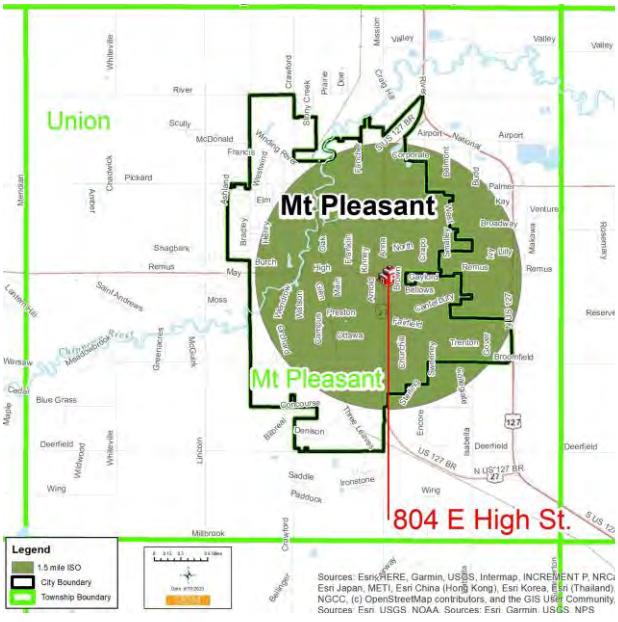
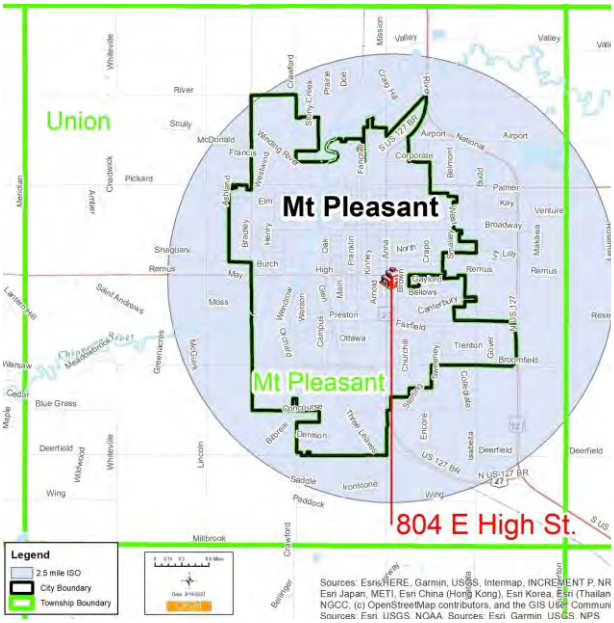
Figure 8: Mt. Pleasant Ladder and Engine Apparatus Coverage-ISO Benchmark

Mt. Pleasant Engine Company
1.5 Mile Benchmark



Mt. Pleasant Ladder Company
2.5 Mile Benchmark



In analysis of these two maps, the city's built upon land is completely covered when benchmarked against the ladder compny standard (one ladder for every 2.5 miles of built upon land), with much of the service gap to the west of the city in the township. When benchmarked against the engine company standard (one engine for evry 1.5 miles of built upon land), a large percentage of the city's built upon land is covered (small gaps are in the northwest and southern areas of the city) and gaps in almost all areas of the township (but covers the higher demand areas in the township).

- Credit for Company Personnel: #571 (4.65/15.00 credits).

This category reviews the average number of existing firefighters and company officers available to respond to first alarm structure fires. Because the MPFD is primarily volunteer POC and are not always at the station (have restricted availability), the ISO-FSRS grading schedule credits three volunteers as equivalent to one career firefighter. The MPFD received credit for 3.78 personnel on duty and 11.00 on-call personnel responding to first alarm structure fires, or divided by three, 3.66 personnel for a total 7.44 personnel.

- Training: #581 (A) Facilities and Use (0.00/35 credits).
  - For maximum credit each firefighter should receive 18 hours per year in structure fire-related subjects as outlined in the NFPA 1001 standard at a training facility where props and fire simulation buildings can be used. The MPFD is not meeting this section to their fullest potential.
- Training: #581 (B) Company Training (9.92/25 credits).
  - For maximum credit, each firefighter should receive 16 hours per month in structure fire-related subjects as outlined in the NFPA 1001 standard. The MPFD is not meeting this section to their fullest potential.

- Water Supply: #630. #631 (4.80/7)
  - This item reviews the fire hydrant inspection frequency, and the completeness of the inspections in accordance with the AWWA M-17 standard. *The credits received (0.00) means fire hydrants have not been inspected in five years or more.*
  - This item also reviews the frequency of flow testing of hydrants. *The credits received (0.00) means the hydrants have not been flow tested for ten or more years.*

Recommendation:

CPSM recommends deficiencies in the 2023 ISO-PPC report should be included in any planning the city and MPFD conducts in the near and mid-terms. This should include planning to improve training deficits, fire hydrant inspection and flow testing, and deployment of resources.

Training and Education

Training is, without question, one of the most essential functions that a fire and EMS department should be performing on a regular basis. One could even make a credible argument that training is, in some ways, more important than emergency responses because a department that is not well trained, prepared, and operationally ready will be unable to fulfill its emergency response obligations and mission. Education and training are vital at all levels of fire service operations to ensure that necessary functions are completed correctly, safely, and effectively. A comprehensive, diverse, and ongoing training program is critical to the fire department's level of success.

An effective fire and EMS department training program must cover all the essential elements of that department's core missions and responsibilities. The level of training or education required, given a set of tasks, varies with the jobs to be performed. The program must include an appropriate combination of technical/didactic training, manipulative or hands-on/practical evolutions, and training assessment to gauge the effectiveness of these efforts. Most of the training, but particularly the practical, standardized, hands-on training evolutions should be developed based upon the department's own operating procedures and operations while remaining cognizant of widely accepted practices and standards that could be used as a benchmark to judge the department's operations for any number of reasons.

Overall MPFD training is governed by SOG#6.1, *Monthly Department Training*. SOG#6.1 outlines department training meeting days and times, what training is considered mandatory, web-based training procedures, and the annual training program/calendar. SOG#6.1 outlines training expectations for shift and POC staff.

Training and education in the MPFD are managed by a Training Officer who reports to the Assistant Fire Chief when this position is filled. The Training Officer is supported by MPFD instructors when implementing or instructing training programs. Together this group coordinates and implements the various Fire and EMS training for the department.

Certain Occupational Safety and Health Administration (OSHA) regulations dictate that minimum training must be completed on an annual basis. The state of Michigan operates under an approved state OSHA program for public employees at the state or local government level.

OSHA Regulations and Standards regulated employers located in the state of Michigan are governed by the Michigan State Plan. Federal OSHA covers issues not covered in the state plan.

This includes Federal OSHA health and safety standards found in the 29 Code of Federal Regulations (CFR). As such, the MPFD should ensure the following are included in the training matrix and program requirements for all uniform personnel:

- Annual review of the respiratory protection standard, self-contained breathing apparatus (SCBA) refresher and user competency training, SCBA fit testing (29 CFR 1910.134).
- Annual Blood Borne Pathogens Training (29 CFR 1910.1030).

Other training requirements the MPFD must manage include:

- The ISO-PPC has certain training requirements for which fire departments receive credit during the ISO-PPC review (as reviewed above).
- In addition to the above, MPFD Standard Operating Procedure 6.1 outlines departmental mandatory annualized training requirements which include:
  - Hazardous Materials Operations Refresher
  - AED/CPR
  - Firefighter Right-To-Know
  - SCBA Safety and Survival, Electrical Emergencies
  - Incident Command Training
  - Radiation
- MPFD Standard Operating Procedure 6.2 outlines departmental required periodic training which includes

Fire Fighting	20 hours monthly
Officer	16 hours annually
Operator/Driver	12 hours annually
Radioactivity	3 hours annually
Bloodborne/Infectious Disease	Annually
*Confined Space Rescue	1 hour annually
Respiratory	Annually
Hazardous materials operations	4 hours annually
Hazardous materials technician	24 hours annually
AED/CPR	Annual
Structural fire fighting	24 hours annually
Firefighter Right-to-Know	As plans are develop not more than 5 years
Medical First Responder	15 hours every 3 years
EMT-B	30 hours every 3 years
Incident Command	Annual

Fire training requirements are governed by the Michigan Department of Licensing and Regulatory Affairs, Firefighters Training Council through Michigan Administrative Code for initial and maintenance of required position certifications.

  - Fire certifications include but are not limited to Firefighter I/II; Fire Chief; Fire Inspector; Fire Instructor; Fire Investigator; Fire Officer; Public Safety Director; Plans Examiner; Hazardous Materials Responder; Technical Rescue Responder; Airport Rescue Firefighter.

- EMS training certification/licensure is governed by the Michigan Department of Health and Human Services, Division of EMS. EMS certifications and licensing includes:

  - Medical First Responder (MFR); EMT; Advanced EMT (AEMT); and Paramedic.

Because so much depends upon the ability of the emergency responder to effectively deal with an emergency, education and training must have a prominent position within an emergency responder's schedule of activities when on duty. Education and training programs also help to create the character of a fire service organization. Agencies that place a real emphasis on their training tend to be more proficient in performing day-to-day duties. The prioritization of training also fosters an image of professionalism and instills pride in the organization.

While the MPFD has a planned training program and there exists a dedicated effort focused on a wide array of training activities, the 2023 ISO-PPC report does expose some deficiencies. These include live firefighting training at a training facility (18-hours/year for every firefighter) and company training (16-hours/month in structural firefighting). Both of these training components represent core subject matter (instructional and hands-on training) for fire departments.

CPSM was informed that it is "difficult to meet" daily and evening training targets, including between MPFD staff and with mutual aid departments. It is clearly reasonable that some days it will be difficult for full time staff to complete training since various time demands throughout the duty day gradually compete with each other, including assigned daily tasks and emergency responses. Every effort should be made to make completion of required and period training an MPFD priority.

MPFD training typically takes place on-site at the MPFD fire station and is led by MPFD instructors. This is typical in fire departments across the country.

The next table outlines the Annual Training Program for CY 2022, which according to the April 2022 Annual Training Plan memorandum, is designed to meet or exceed MIOSHA Part 74 Fire Fighting training requirements.

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Table 5: MPFD 2022 Annual Training Plan

Training Type	Firehouse Training Code	Requirements	Source
Minimum Individual Training		20 hours/monthly	ISO
Driver/Operator Training	Driver - Operator Training	12 Hours/Annually	ISO
Radioactivity	HazMat - RAD	3 Hours/Annually	ISO
Officer Training	Admin - Leadership	16 Hours/Annually	ISO
Bloodborne/Infectious Disease	EMS - INFDIS	1 hour Annually	MIOSHA/NFPA
Respiratory Program	SCBA - FT/PFT/RPP	Annually	MIOSHA/NFPA
Haz Mat Operations Level	HazMat - any of the 13 topics	8 Hours/ Annually	MIOSHA/NFPA
Haz Mat Technician Level	HazMat - any of the 13 topics	24 Hours/Annually	MIOSHA/NFPA
AED/CPR	EMS - AED/CPR	Annually	AHA
Structural Firefighting	FIRE - any of the 21 topics	24 Hours Annually	
Fire Fighter Right To Know	HazMat - FFRTK	Annually	PA 154/NFPA
Medical First Responder (CEU)	EMS - Medical Continuing Ed	15 Hours / 3 years	State of Michigan
EMT Basic (CEU)	EMS - Medical Continuing Ed	30 Hours / 3 years	State of Michigan
Incident Command System	FIRE - ICS - Review	Annually	MIOSHA/NFPA
SCBA Safety and Survival	FIRE - FFS&S	Annually	NFPA
ICC Continuing Education	ICC - IPMC Continuing Ed	15 Hours / 3 years	ICC
Technical Rescue	TECH RESCUE - 8 Topics	Annually	MIOSHA/NFPA

Professional development also occurs outside of the MPFD requirements. Department staff can participate in training external from the department. Staff must be approved for these courses and any cost or time off must be approved as well.

Recommendations:

- The MPFD should make it a priority to ensure evening and weekend training and daily in-station training occurs as scheduled and/or required.
- The MPFD should continue to develop and budget for its fire officer training and development program. To further enhance the program the department should consider components that are competency-based on National Fire Protection Association (NFPA), International Association of Fire Chiefs (IAFC), and International Fire Service Training Association (IFSTA) standards, and that focus on contemporary fire service issues including community fire protection and emergency services delivery approaches; fire prevention practices; firefighter safety and risk management; employee relations; reviewing, approving, or preparing technical documents and specifications; departmental policies; standard operating

procedures; formal internal communications; improving organizational performance through process improvement and best practices initiatives; and having a working knowledge of information management and technology systems.

- The MPFD should develop a plan to provide all personnel with mandatory high-intensity training on subjects such as periodic live fire training on at least a semi-annual basis; live fire facility training to include fireground basics such as hose and ladder evolutions, forcible entry, ventilation, search and rescue, and vehicle extrication. This should include practical skills competency and proficiency evaluations (non-punitive) as part of the department's comprehensive fire training program. Available buildings scheduled for demolition work well for this training.
- The MPFD should continue to support and budget for external training opportunities at the state and national level (National Fire Academy and Emergency Management Institute).

Planning and Performance Measures

Organizing and managing a contemporary fire department requires results-oriented and well-thought-out and achievable goals and objectives. In addition, to determine how well an organization or program is doing requires that these goals be measurable and that they are measured against desired results. Included in a fire organization's key internal planning components should be a formal strategic plan and a diverse set performance measures.

A Fire Department Strategic Plan encompasses both a baseline gap analysis of the organization and a "road map" to develop and achieve a planned response to specific factors which will or potentially will affect the organization's mission, or in the case of a public safety agency, service deliverables. A Fire Strategic or Master Plan identifies the purpose of an organization, what the organization will do and how it will perform though goals and measurable objectives. It specifies baseline capabilities, real or potential constraints that may exist or be placed on the organization and delivers a set of goals and requirements to achieve identified objectives and desired outcomes.

Defining clear goals and objectives for any organization through a formal strategic planning document establishes a resource that any member of the organization, or those external to the organization, can view and determine in what direction the organization is heading, and as well how the organization is planning to get there.

In a strategic plan, it is essential that clear and achievable goals and objectives for each program area and service deliverable are developed. Each program area must then (1) define its goals; (2) translate the goals into measurable indicators of goal achievement; (3) collect data on the indicators from those who have utilized the program; and (4) compare the data from program participants and controls in terms of goal criteria.[7] Objectives should be SMART (specific, measurable, ambitious/attainable, realistic, and time-bound). Additionally, these goals should link back to the city's fiscal planning goals and the Commission's strategic goals and initiatives.

7. Starling, *Managing the Public Sector,* 287.

Because fire services are dynamic and should be measured for efficiency and effectiveness at a minimum, the development of the plan should involve members of the department as well as members from the community.

As there is no perfect strategic planning model for an organization, the above model provides an alternative from which the organization can begin to develop a strategic planning process, and eventually a strategic plan. Listed below are the steps for a successful approach to this critical process:[8]

Purpose-Mission: This is the statement that describes why an organization exists. This statement should describe what customer needs are intended to be met and with what services. Organizational and community buy in, and top-level management should agree what the mission statement/purpose is, understanding this will change over the years as the organization changes.

Selection of goals the organization must meet to accomplish its mission: Goals are general statements about what needs to be accomplished to meet the purpose, or mission, and address major issues facing the organization.

Identify specific approaches or strategies that must be implemented to reach each goal: The strategies are often what change the most as the organization eventually conducts more robust strategic planning, particularly by more closely examining the external and internal organizational environments.

Identify specific actions to implement each strategy: An organization must identify specific activities each division or major function must undertake to ensure it is effectively implementing each strategy. Objectives should be clearly worded to the extent that staff and the community can assess if the objectives have been met or not. Ideally, top management develops specific committees that each have a work plan or set of objectives.

Monitor and update the plan: Regularly reflect on the extent to which the goals are being met and whether action plans are being implemented. Perhaps the most important feedback is positive feedback from customers, both internal and external.

Performance measures include one of the more important elements of strategic planning. In local government performance measures describe service delivery performance so that both citizens and those providing the service have the same understanding. The customer will ask, "Did I get what I expected?" The service provider will ask, "Did I provide what was expected?" Ensuring that the answer to both questions is "yes" requiring organizational alignment with these expectations.

The MPFD has developed and utilizes budget indicators that currently serve as performance measures. These indicators are output measures and include:

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8. McNamara, C.: (1996-2007) *Basic Overview of Various Strategic Planning Models.* Adapted from the Field Guide to Nonprofit Strategic Planning and Facilitation. (Minneapolis, MN: Authenticity Consulting, LLC).

Table 6: MPFD Budget Indicators

# of commercial inspections conducted	Normal response time-Township	# of housing inspections
FFRTK pre-plans completed	Time on task to complete fire reports	# of single family rental properties
Types of occupancies in jurisdiction served	Total incidents per year-City	# of duplex rental properties
Time on task for commercial inspections	Total incidents per year-Township	# of condominium rental properties
# of code enforcement civil infractions	Total incidents per year-Mutual Aid	# of new commercial property inspections
# of code enforcement notice of violation issued	Percentage of the total calls: Township	# of commercial inspections conducted: Township
# of unlicensed rental properties identified	# of fires extinguished	Percentage of commercial inspections: Township
Normal response time-City	# of EMS responses	

To ensure both citizens and those providing the service understand the overall service delivery goals, CPSM recommends the MPFD expand any current goals and objectives/budget indicators to include efficiency, effectiveness, and outcome measures, and that any measures are reported on a scheduled basis so that both internal members and the public can review the processes in place, and to ensure that these processes are being measured for continuous improvement. The various types of performance measures are outlined in the next table.

Table 7: Performance Measures

Category	Definition
Input indicators	These are designed to report the number of resources, either financial or other (especially personnel), that have been used for a specific service or program.
Output indicators	These measures indicate the amount of work performed or number of services received. Workload or output measures indicate what was done but not how well it was done.
Efficiency (and cost-effectiveness) indicators	These measures reflect the quality of work performed. They tie together work, resources and results.
Productivity Measures	These measures add efficiency and effectiveness. Productivity ties together work, cost, resources, and results.

To summarize, establishing a performance management system within the framework of an overall strategic plan will help city management, elected officials, and the community gain a better understanding of what the MPFD is trying to achieve.

Recommendations:

- CPSM recommends the MPFD, along with internal and external stakeholder input develop a three-five year strategic plan that outlines the mission, vision, and values of the department, and that includes near, mid, and longer term organizational goals. Ideally, this plan would be developed in the context of a clear vision of what the department will look like in the future.
- CPSM recommends the MPFD develop and implement a performance measurement reporting system that includes input, efficiency, and productivity measures in addition to the standard workload and output measures the department utilizes in their current budget indicator reporting system.

Policy and Procedure Review

The MPFD operates under policy guidance from the city regarding employment, human resources, and related municipal matters. In addition, the fire department operates under Standard Operating Procedures (SOPs) and Policies and Procedures that are specific to its internal operations. Fire departments typically manage and direct operational and administrative matters in the same manner as described here.

In review of the MPFD SOPs and Policies and Procedures in place, it is noted the documents are segregated by Chapter to include operations; community risk reduction; logistics and radios; firefighting and safety; training, and administrative. Although these policies and procedures are necessary and establish the basis for all department operations in the station, on the emergency scene, when conducting certain inspections and investigation of fires, and for administrative tasks and duties, CPSM found that, due to the large number of these documents, understanding and following all policies can be cumbersome and complicated.

Additionally, we found that there are current SOPs and Policies and Procedures that have some age (beyond 8-10 years since the last update) and may have exceeded their life expectancy. While older policies may still have their relevancy in part, the Fire discipline is dynamic and evolves with each new NFPA standard, contemporary new practice or protocol, or other innovation or health and safety issue or theme this discipline contends with. For these reasons, fire and EMS departments should make every effort to maintain up-to-date policies and directives, which are consistent with national best practices, NFPA documents, in particular those that involve Fire operations, health, and safety.

One way to look at the management requirements of SOPs is through the use of the systems theory, which is a concept that focuses on the interrelationships among components of a process.[9] In the fire service there are many internal and external forces that have to be considered when delivering services, which begins with administrative and preparatory processes. The systems theory suggests the organizational system has four elements: inputs from the environment, including information and other resources (external forces such as NFPA, state and local law etc.); transformations, the managerial or technological processes used to convert inputs to outputs (understanding the external and internal forces); outputs in the form of desired products or services (organizational concepts, non-emergency activities, and emergency

9. Stewart, J., Ayres, R. Systems theory, and policy practice: An exploration. *Policy Sciences* (2001)

activities); and feedback, the environment's reaction to outputs (the driver to continuously review existing processes). Feedback also serves as an input during future iterations of the process, thus completing the cycle and continuous improvement. When developing or renovating current polices and procedures, it is important that the MPFD consider all internal and external forces/relationships prior to implementation.

Recommendation:

CPSM recommends the MPFD develop a management process that ensures Standard Operating Procedures and Policies and Procedures remain current, represent a contemporary fire department, reflect current best practices, and consider all internal and external forces and relationships prior to implementation.

Health, Safety, and Wellness

The prevention and reduction of accidents, injuries and occupational illnesses should be established goals of any fire-rescue department and should be primary considerations at all times (emergency and non-emergency activities). This concern for safety and health must apply to all members of the fire-rescue department and should include others who may be involved in fire department activities.

MPFD should strive to make every reasonable effort to provide a safe and healthy work environment, recognizing the dangers involved in the types of service fire-rescue departments deliver. Included in this effort should be appropriate and continuous training, supervision, procedures, program support and review to achieve department health and safety objectives in all department functions and activities.

Firefighting and to some degree EMS service delivery are inherently dangerous activities occurring in environments over which the participants have no engineering control. NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs* was developed to provide a "consensus standard for an occupational safety and health program for the fire service." NFPA 1500 is intended to be an umbrella document, establishing the basic framework for a comprehensive safety and health program, and providing for its implementation and management.

The Health and Safety function in MPFD is handled primarily by the Fire Chief, fulltime shift officers, and POC officers. Health and safety are intrinsically built into all operational policies and procedures. The following MPFD policies and or procedures specifically address health and safety:

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Table 8: MPFD Health and Safety Policies and Procedures

1.1: Emergency Evacuation Signal	1.31: Health & Safety Officer	5.6: Respiratory Protection Program
1.14: Incident Command System	1.32: Rehabilitation at Emergency Operations	5.7: Safety Belt Use
1.15: Pernal Accountability System	3.12: Cleaning of Personal Protective Equipment	5.8: Lockout-Tagout
1.20: Road Safety	5.1: Personal protective Equipment	5.9: Hazard Communications Policy
1.25: Rapid Intervention Teams	5.4: SCBA-Interior Firefighting	

In 2021, the NFPA produced *The Fifth Needs Assessment of the U.S. Fire Service* and revealed the following:

- 72 percent of departments lack a program to maintain basic firefighting fitness and health.
- 61 percent of departments don't provide medical and physical evaluations for all firefighters that comply with *NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments.*
- 73 percent of departments lack a behavioral health program (larger departments are much more likely to have such a program).
- 56 percent of fire stations are not equipped for exhaust emissions control; this number rises to 82 percent in the smallest communities.
- Many departments do not engage in cancer prevention best practices.[10]

A successful health, safety, and wellness program requires:

- Senior Management buy-in.
- The establishment of a Health & Wellness Committee.
- A department needs assessment.
- The establishment of obtainable goals and objectives.
- The establishment of a budget for health, safety, and wellness.
- Implementation.
- Evaluation.[11]

Primary goals of a comprehensive health, safety, and wellness should include:

- Reducing injury leave and light duty due to on-the-job injuries.

10. Creating a Health & Wellness Program for Your Department, Firehouse Magazine, October 2022.
11. ibid

- Potentially lowering workers' compensation and employee health care costs.
- Reduction of injuries.[12]

Firefighter injuries and deaths are devastating to families, fellow responders, local governments, and the community. The National Institute for Occupational Safety and Health (NIOSH) has studied firefighter fatality root causes, and found five key factors, which are commonly referred to as the NIOSH 5:

- Lack of fireground firefighter accountability.
- Lack of fireground communication methods.
- Lack of standard operating procedures related to response and fireground operations.
- Lack of incident management/command.
- Lack of appropriate risk assessment of the incident as whole, the building, the emergency scene, and basic fireground knowledge to understand the risk.

These five fireground factors should be etched in every firefighter's brain. A fire department training regimen, equipment, guidelines, and culture should center on these five factors. A lack of understanding of these five factors leads to sloppy, ineffective, and unsafe fireground operations. *They should be taken seriously.*

Managing the health, safety, and wellness components of a fire-rescue department are as important as any other, as the concepts of health, safety, and wellness apply to both emergency and non-emergency activities. For MPFD this will take dedicated staff hours and oversight from a command and station level.

Recommendation:

CPSM recommends MPFD develop a health, safety, and wellness committee, and further develop a comprehensive health, safety, and wellness initiative program that aligns with NFPA 1500, *Standard on Fire Department Occupational Safety and Wellness Programs, 2021 edition.* CPSM further recommends the Fire Chief have department health, safety, and wellness oversight as the department Health and Safety Officer.

Community Risk Reduction and Code Enforcement

Community Risk Reduction activities are important undertakings of a modern-day fire department. A comprehensive fire protection system in every jurisdiction should include, at a minimum, the key functions of fire prevention, code enforcement, inspections, and public education. Preventing fires before they occur, and limiting the impact of those that do, should be priority objectives of every fire department.

Fire suppression and response, although necessary to protect property, have negligible impact on preventing fire. Rather, it is public fire education, fire prevention, and built-in fire protection systems that are essential elements in protecting citizens from death and injury due to fire, smoke inhalation, and carbon monoxide poisoning. The fire prevention mission is of utmost importance,

12. ibid

as it is the only area of service delivery that dedicates 100 percent of its effort to the reduction of the incidence of fire.

The Fire Marshal (Lieutenant position) staffs the community risk reduction function. The MPFD community risk reduction function includes fire prevention inspections for hotels and any new commercial construction or renovation work that requires a permit. The Fire Marshal also participates with and assists the State Fire Marshal's office with fire prevention inspections to properties the State Fire Marshal's Office is responsible for in the city and township.

At the time of this analysis the MPFD Fire Marshal's Office was utilizing the following Building and Fire Codes:

- International Fire Code, 2012 edition.
- Michigan Building Code, 2015 edition.
- Michigan Residential Code, 2015 edition.
- City Ordinances.

The next table provides a historical analysis of MPFD fire code inspections.

Table 9: MPFD **Fire Marshal's Office** Commercial Fire Inspections Completed

2020	2021	2022
226	373 properties /237 units	309

Time on task for commercial inspections is outlined in the next table.

Table 10: MPFD **Fire Marshal's Office** Commercial Fire Inspections Time on Task

	2020	2021	2022
Time on Task-Inspection	30 minutes	30 minutes	30 minutes
Time on Task-Data Entry	15 minutes	30 minutes	15 minutes

As a function of community risk reduction, the MPFD conducts fire/safety inspections on rental housing properties to insure these properties meet established rental property requirements such as:

- Egress from structure
- Basement rooms are not used for sleeping or living areas unless there is a secondary means of egress
- Smoke detectors are present and working and positioned in accordance with city and the fire code standards.
- Parking is provided for tenants in accordance with city zoning regulations.
- Heating, ventilation, plumbing, water heating, and electrical are in good working order.
- Occupancy levels are in accordance with established/authorized occupancy number.

Rental inspections are currently performed by MPFD shift operational personnel. Potential operational response impacts of using shift personnel when minimum staffing is at two is discussed in Section 4.

The next table outlines a historical analysis of MPFD rental inspections.

Table 11: MPFD Rental Inspections (Initial)

2020	2021	2022
5303	1601 properties/5178 units	1640 properties/5750 units

The MPFD also oversees the city's Code Enforcement function. Code Enforcement enforces property maintenance codes and zoning regulations as it pertains to the health, welfare, and safety of the citizens of Mt. Pleasant. The Code Enforcement staff utilizes the International Property Maintenance Code, city ordinances, and the zoning code during inspection activities.

The next table outlines a historical analysis of Code Enforcement activity.

Table 12: Code Enforcement Activity

	2020	2021	2022
Violation Notices Issued	1459	1563	1353
Civil Infractions Issued	8 (COVID)	85	71

CPSM makes a Community Risk Reduction staffing recommendation in Section 4 as it relates to operational shift staffing.

Emergency Medical Services

Emergency Medical Services (EMS) in Mt. Pleasant and Union Township is provided by Mobile Medical Response, Incorporated (MMR). MMR provides this service through a contract with Isabella County (Isabella County Ambulance Service Agreement). Through the contractual agreement with the county, MMR is the exclusive provider of mobile basic and advanced life support services.

MMR is currently accredited by:

- The National Academies of Emergency Dispatch
- The Commission on Accreditation of Ambulance Services
- The Commission on the Accreditation of Allied Health Education Programs

Units of local governments make substantial annual investments in their emergency medical service (EMS) systems. That investment is typically divided up between the 9-1-1 communications center, the fire department's non-transport medical first response efforts, and EMS.

In evaluating the current performance of EMS for this analysis, it is important to understand the evolution of EMS since its modern application spans several decades. The need for increased coordination in patient care and higher quality care at lower costs has made it essential for EMS agencies to have in-place quality control or quality improvement programs that rely on key

performance indicators to continuously monitor the system's overall performance and the effectiveness of the different prehospital measurements.

CPSM examined all responses by MMR ambulances in Mt. Pleasant and Union Township between May 1, 2022, and April 30, 2023. During the study period, MMR responded to 4,729 runs, of which an MMR ambulance arrived on scene 4,350 times (92 percent) and made 3,052 transports (65 percent). The next tables outline the call types and number of responses.

EMS Deployment Model and Response Times

There are numerous deployment models that can be utilized and integrated into an EMS agency's operational needs. Each has its own positives and negatives and must be balanced with the key elements of service deliverables, response time performance, and funding. In terms of efficient and effective deployment in MT. Pleasant within the context of this report, MMR must meet all operational needs and performance criteria that support the EMS response as outlined in the service contract.

The current EMS delivery system in Mt. Pleasant and the Charter Township of Union features a tiered response structure with a contracted private third-party treatment/transport service and first responder capabilities from the MPFD.

A tiered EMS response system categorizes medical emergencies based on severity, providing a corresponding level of response. The tiers include Basic Life Support (BLS), Advanced Life Support (ALS), and Critical Care Transport (CCT). This system ensures appropriate care based on the medical condition, utilizing responders with varying levels of training and interventions.

EMS deployment models are used to determine the best locations for ambulances and EMS crews to be stationed in order to provide timely responses to emergency medical calls. There are several different models that can be used, including:

- Grid deployment: This model involves dividing a community into a grid and stationing ambulances at key intersections within the grid. This approach is often used in urban areas with a high call volume.
- Cluster deployment: This model involves stationing ambulances at strategic locations around a community, such as hospitals or fire stations. This approach is often used in suburban or rural areas with lower call volumes.
- Dynamic deployment: This model involves using real-time data to determine the best locations for ambulances to be stationed based on current call volume and response times. This approach is often used in areas with highly variable call volumes.

Regardless of the deployment model used, response times are a critical factor in determining the effectiveness of EMS services. Response time is the time it takes for an ambulance or EMS crew to arrive at the scene of an emergency. The goal of EMS agencies is to achieve response times that provide timely care to patients in need.

Response times can be affected by a range of factors, including the deployment model used, the location of the emergency, traffic conditions, and weather.

However, it is important to note that response times alone do not necessarily indicate the quality of care provided by EMS crews. Other factors, such as the training and experience of EMS personnel, the quality of equipment and supplies, and the availability of advanced medical care, can also impact patient outcomes. As such, it is important to consider a range of factors when evaluating the effectiveness of EMS services in a community.

Mobile Medical Response (MMR) is the primary EMS ground transport responder to EMS requests in the City of Mt. Pleasant and the Charter Township of Union. The current deployment model is a Hybrid Based System Status Management (SSM) deployment, accompanied by static based station deployment, whereby units start & stop from a designated station, which can also serve as a posting / respite location during operations. Based upon a detailed data analysis, we assess whether a *Hybrid Based System Status Management* deployment model is consistent with current system needs, as evidenced by the response performance analysis provided in this report.

EMS response times are measured differently than fire service response times. Where the fire service uses NFPA 1710 and 1720 as response time benchmarking documents, EMS' focus is and should be directed to the evidence-based research relationship between clinical outcomes and response times. Much of the current research suggests response times have little impact on clinical outcomes outside of a small segment of call types. These include cerebrovascular accidents (stroke), injury or illness compromising the respiratory system, injury or illness compromising the cardiovascular system, including S-T segment elevation emergencies, and certain obstetrical emergencies. Each requires rapid response times, rapid on-scene treatment, and rapid transport to the hospital.

That said, there are no national response time benchmarks for EMS. EMS response times are typically established by the local jurisdiction. In Isabella County (including Mt. Pleasant and the Charter Township of Union), this is outlined in the current service agreement. Workload for Mt. Pleasant and Union Township are outlined in the next two tables.

Table 13: Runs by Type (Mt. Pleasant and Union Township)

Run Type	Total Runs	Percent of Total	Arriving Runs	Arriving Rate	Transport Runs	Transport Rate
Breathing difficulty	465	9.8	444	95.5	346	74.4
Cardiac and stroke	543	11.5	518	95.4	374	68.9
Fall and injury	1,043	22.1	967	92.7	562	53.9
Illness and other	1,439	30.4	1,335	92.8	986	68.5
MVA	229	4.8	205	89.5	110	48.0
Overdose and psychiatric	458	9.7	369	80.6	297	64.8
Seizure and unconsciousness	552	11.7	512	92.8	377	68.3
Total	4,729	100.0	4,350	92.0	3,052	64.5

Illness and Other 30% of the total.

Fall and Injury 22% of the total.

Cardiac and Stroke 11% of the total.

Motor Vehicle Accidents 5% of the total.

Table 14: Runs by Location

Location	Run Count	Percent Runs	Runs Per Day
Mt. Pleasant	3,046	64.4	8.3
Union Township	1,683	35.6	4.6
Total	4,729	100.0	13.0

These tables tell us that:

- Runs for the year average 13.0 per day.
  - 8.3 per day in Mt. Pleasant
  - 4.6 per day in Union Township
  - 64 percent of MMR's runs were in Mt. Pleasant and 36 percent were in Union Township.

The service between MMR and the county establishes a *level of performance* that must be met by MMR. The level of service is defined in terms of response time performance standards. The contract defines two zones (A and B) which the performance standards are benchmarked against. Mt. Pleasant and Union Township are in Zone A. The performance standards for Zone A as delineated in the current contract are:

- Response time of 10:59 or less 80% of the time for Priority One (1) emergency calls.
  - Life-threatening emergency calls as defined by the Medical Priority Dispatch System, ProQA protocols endorsed by the Isabella County Medical Authority.
  - Performance standard calculated on a four month (tri-annual) basis.
  - If a call is upgraded from a lower priority to a priority one (1) emergency call, the response time calculation for the emergency call begins when the call is upgraded.
  - If/when more than one MMR unit is dispatched, the response time is measured for the first arriving ambulance.

CPSM performed a response time analysis for MMR responses into Mt. Pleasant and Union Township. In this analysis, response times are separated into identifiable components. *Dispatch time* is the difference between the time a run is received and the time a unit is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. *Turnout time* is the difference between dispatch time and the time a unit is en route to a run's location. *Travel time* is the difference between the time en route and arrival on scene. *Response time* is the total time elapsed between receiving a run to arriving on scene.

In this analysis, we included all runs where at least one MMR unit arrived. In addition, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time. Also, runs with a total response time exceeding one hour were excluded. ***All runs labeled as "P-1 Life Threatening Emergency" were included in** this analysis, while non-life-**threatening emergencies labeled as "P-2" or "P-3" were excluded.***

Based on the methodology above, for 4,729 runs, we excluded 1,860 non-life-threatening runs, 156 runs where no units recorded a valid on-scene time, four runs with a total response time exceeding one hour, and 20 runs where one or more segments of the unit's response time could not be calculated due to missing or faulty data. As a result, in this section, a total of 2,689 calls are included in the analysis.

The next tables outline our response time analysis of MMR for Mt. Pleasant and the Charter Township of Union.

In review of the response time analysis, for the one-year period CPSM examined, overall MMR meets the current level of service response time performance standard in Mt. Pleasant (all calls) and is 60 seconds (all calls) out of the level of service benchmark for the Charter Township of Union.

Table 15: 80th Percentile Response Time (Minutes) by Run Type

Run Type	Dispatch	Turnout	Travel	Total	Total Runs
Breathing difficulty	1.0	1.6	8.5	10.7	433
Cardiac and stroke	1.1	1.5	8.7	10.5	458
Fall and injury	1.1	1.6	8.9	11.1	490
Illness and other	1.0	1.6	9.2	11.4	666
MVA	0.9	1.4	7.0	9.2	159
Overdose and psychiatric	1.2	1.2	8.3	9.8	105
Seizure and unconsciousness	1.0	1.5	8.6	10.3	378
Total	1.0	1.5	8.8	10.8	2,689

Table 16: Response Time by Location (Minutes)

Location	Measure	Dispatch	Turnout	Travel	Total	Total Runs
Mt. Pleasant	Average	0.9	1.2	6.5	8.6	1,740
	80th Percentile	1.0	1.6	8.1	10.2	
	90th Percentile	1.7	2.3	10.7	13.0	
Union Township	Average	0.9	1.1	7.5	9.5	949
	80th Percentile	1.1	1.5	9.7	11.8	
	90th Percentile	1.7	2.2	12.4	14.9	
Total	Average	0.9	1.1	6.9	8.9	2,689
	80th Percentile	1.0	1.5	8.8	10.8	
	90th Percentile	1.7	2.3	11.4	13.9	

Response time key points:

- Run Types and Dispatch:
  - The report categorizes runs into various types, such as Breathing Difficulty, Cardiac and Stroke, Fall and Injury, Illness and Other, MVA, Overdose and Psychiatric, and Seizure and Unconsciousness.
  - Illness and Other runs constitute the largest category at 30%, and Motor Vehicle Accidents (MVA) make up 5% of the total runs.
  - The percentage of arriving runs is 92%, and transport runs constitute 65% of the total.

Any of these call types can be initially classified as life-threatening or upgraded to life threatening at any time after dispatch.

- MMR response times:
  - The overall average response time is 8.9 minutes.
  - Runs in Mount Pleasant have an average response time of 8.6 minutes, while in Union Township, it is 9.5 minutes.

- The 80th percentile MMR service level agreement standard response time for life-threatening calls is 10.8 minutes 80 percent of the time. As indicated above the MMR response time for Mt. Pleasant is10.2 minute, which meets the current service agreement (all calls).
- For the Charter Township of Union, the MMR response time is 11.8 minute, indicating MMR may not meet the service level agreement for all life threatening calls as our analysis shows a plus sixty seconds for all calls.

- MPFD EMS response times:
  - MPFD 80th percentile response time to EMS calls is 8.9 minutes overall, indicating that 80% of the MPFD 273 EMS responses are completed within this time frame, which means MPFD units generally arrive prior to MMR when responding to EMS calls, and begin treatment of patients.
  - The MPFD 80th percentile response times (all calls) shows variations between the two locations, indicating EMS call response may be extended past 8.9 minutes based on distance.
    - Mt. Pleasant: 8.9 minutes.
    - Charter Township of Union: 11.1 minutes

It is assessed MMR's' response times are within the service agreement's parameters for Mt. *Pleasant for all calls. Overall and for all calls for the Charter Township of Union, MMR is + 60 seconds on response time. The difference in response between the city and the township is in travel time. The 80th percentile travel time for the city is 8.1 minutes and for the township it is 9.7 minutes.*

Medical Direction

EMS (Emergency Medical Services) Medical Direction is the process by which medical oversight and guidance are provided to EMS personnel and agencies. Medical Direction is typically provided by licensed physicians who specialize in emergency medicine or another relevant field and who have experience and training in EMS.

The role of medical direction in EMS includes several key functions:

- Clinical oversight: Medical directors provide clinical oversight and guidance to EMS personnel, ensuring that they are following the latest medical protocols and providing the best possible care to patients.
- Protocol development: Medical directors are responsible for developing and updating medical protocols for EMS agencies based on the latest medical research and best practices.
- Quality assurance: Medical directors monitor and evaluate the quality of care provided by EMS personnel, identifying areas for improvement, and implementing changes to improve patient outcomes.
- Continuing education: Medical directors provide ongoing education and training to EMS personnel, ensuring that they stay up to date with the latest medical advances and best practices.
- Collaboration: Medical directors work closely with other healthcare providers, including hospitals and other emergency medical responders, to ensure that patients receive the best possible care throughout the entire continuum of care.

Overall, EMS Medical Direction plays a critical role in ensuring that EMS personnel are well-trained, equipped, and supported to provide high-quality emergency medical care to patients. By providing clinical oversight, developing protocols, ensuring quality assurance, providing continuing education, and collaborating with other healthcare providers, medical directors can help to improve patient outcomes and promote better community health and safety.

The Primary Medical Director at the time of this report is Dr. Sean Ramsey, DO, EMT; an experienced EMS Medical Director who provides Medical Direction MMR.

Additional Medical Direction is provided at the state and regional levels by Medical Control Authorities (Isabella County MCA) under Dr. Daniel Wilkerson, MD. Isabella County MCA responsibilities include:[13]

- The supervision and coordination of the EMS system;
- Establishing written protocols for the practice of life support agencies and EMS personnel;
- Circulating draft protocols to all significantly affected persons for review and submitting to the department for approval.
- Ensuring physicians, hospital staff, and providers are educated on protocols.
- Quality control regarding the adherence to medical protocols

This additional level of oversight and coordination between local and regional medical direction ensures system quality.

***It is assessed MMR's' Medical Direction program/practices are consistent with current EMS best** practices for EMS Physician engagement, clinical oversight, and program development.*

Training and Certification

The provision of high-quality EMS relies on a well-trained and highly skilled workforce MMR is committed to ensuring that its EMS personnel receive the necessary training and certifications to deliver exceptional care to the community. This section outlines MMR's approach to training and the certifications required for EMS personnel.

Initial Training

MMR's EMS personnel, including Paramedics and Emergency Medical Technicians (EMTs), undergo rigorous initial training to ensure they are well-prepared for their roles. This training includes a partnership with paid training and course offerings through the Great Lakes Bay Consortium, which is one of seventeen accredited and approved programs in the state of Michigan. This direct partnership between MMR and the Great Lakes Bay Consortium is part of MMR's strategic recruitment and retention strategies.

- Paramedic Training: Paramedics receive extensive training in advanced life support procedures, including airway management, cardiac care, medication administration, and trauma care. This training is often a formal program that culminates in certification. After a specified period of time paramedics are all trained as a Specialty Care Paramedic. At the time of this report, according to MMR, their stated goal is to have all providers trained to the highest level. CPSM assesses this is consistent with MMR's strategic review.
- EMT Training: EMTs receive training in basic life support techniques, including CPR, oxygen administration, and patient assessment. Like paramedics, this training involves formal

13. Medical Control Authorities (michigan.gov)

coursework and clinical experience. It was reported during CPSM's interview with MMR administration effective February 2024, they are enhancing the scope of practice for their BLS providers, which includes a BLS drug bag containing Epi, Glucagon, Nitro, and Aspirin. CPSM assesses these service enhancements are consistent with current best practices.

Continuing Education

EMS is an ever-evolving field, and ongoing education is essential to staying up to date with the latest developments, protocols, and technologies. MMR provides continuing education to ensure its EMS personnel maintain their skills and knowledge. This includes:

- Regular Recertification: Paramedics and EMTs are required to renew their certifications periodically. This process involves meeting continuing education requirements and passing written and practical exams.
- Advanced Training: MMR offers advanced training opportunities to paramedics and EMTs, including courses on topics such as pediatric care, advanced cardiac life support (ACLS), and prehospital trauma life support (PHTLS).

Multi-Disciplinary Training

Effective emergency response often involves collaboration with other agencies and healthcare providers. MMR EMS personnel participate in multi-disciplinary training exercises and programs to ensure seamless coordination with hospitals, law enforcement, and other first responders. At the time of this review, it was reported by MMR administration that there is a strong operational relationship that exists between MMR and the Mt. Pleasant Fire Department, to include annual functional exercises, and routine collaborative joint training.

Simulation Training

Simulation training plays a vital role in preparing EMS personnel for real-world scenarios. MMR employs simulation labs and scenarios that replicate various medical emergencies to enhance decision-making, teamwork, and clinical skills in collaboration with the Central University of MI College of Medicine's Sim Lab.

Training Records and Documentation

MMR maintains comprehensive records of all training and certifications, ensuring that personnel are compliant with requirements and prepared for their roles.

By emphasizing initial and ongoing training, certifications, and a commitment to staying current with best practices, MMR ensures that its EMS personnel are ready to respond to a wide range of medical emergencies and provide the highest standard of care to the community.

Training Quality Assurance/Quantity Improvement (QA/QI)

Training and quality improvement are essential hallmarks of liability prevention and risk management. For instance, ambulance-related vehicle accidents are a common risk area. Well-run driver training is essential, as are periodic updates and training refreshers. Becoming familiar with your response area can help avoid response delays, wrong turns, and last-minute maneuvers that can create risk. In addition, individual providers can help themselves by doing their "homework"—knowing their system's protocols and avoiding unjustified protocol deviations can help keep them out of hot water with their employer, medical director, and state EMS office.

EMS Training QA/QI (Quality Assurance/Quality Improvement) is an essential process that helps to ensure that EMS personnel receive high-quality training and that their skills are maintained and improved over time.

The QA/QI process involves several steps:

- Establishing performance standards: This involves defining the performance standards for EMS personnel, including the skills and knowledge required to provide effective emergency medical care.
- Monitoring performance: EMS agencies should regularly monitor the performance of their personnel to ensure that they are meeting the established performance standards. This may involve reviewing patient care reports, observing personnel in action, and reviewing other performance metrics.
- Identifying areas for improvement: Based on performance monitoring, EMS agencies should identify areas for improvement and develop plans to address any deficiencies in training or skills.
- Implementing improvements: EMS agencies should implement improvements to their training programs and other systems based on their performance monitoring and identification of areas for improvement.
- Evaluating effectiveness: After implementing improvements, EMS agencies should evaluate the effectiveness of their changes and make further adjustments as needed to ensure that EMS personnel are receiving the best possible training and support.

The QA/QI process is critical for ensuring that EMS personnel are well-trained and prepared to provide effective emergency medical care. By regularly monitoring performance and making improvements to training programs and other systems, EMS agencies can ensure that their personnel are providing high-quality care to patients in their communities.

Our review of Mobile Medical Response reveals a dedicated training division and a Quality Committee that drives education initiatives. Current training is provided on a routine basis and addresses both BLS and ALS-specific training opportunities. MMR Clinical Committee ensures yearly skills reviews and is engaged in all levels of EMS education for MMR providers.

CPSM assesses at the time of our review that Mobile Medical Response's training program *ensures regular, routine, and validation-****based training. The standards from MMR's QA/QI Review*** *and evaluation-led training are consistent with Industry practices and are aligned with CAAS accreditation standards for a consistent QA/QI Training Program.*

Recommendations:

- Overall, and based on our assessment of MMR, CPSM does not recommend a change in EMS ground transport services. Further, CPSM does not recommend the city or the township or both together implement a dedicated municipal EMS service, as currently neither the city nor the township bear a cost for providing EMS transport, and that this service will add additional annualized costs to each with no guarantee of full revenue cost recovery.
- Based on response times in the city by MPFD to EMS calls (8.9 minutes), which shows the MPFD will likely arrive prior to MMR on EMS calls, CPSM does recommend the MPFD continue to respond to high acuity EMS calls as established through the Medical Priority Dispatch System, ProQA protocols, which are endorsed by the Isabella County Medical Authority, as this first tier EMS response is a best practice.

- Current MMR service agreement response time requirements for Zone A (life threatening calls): 10.8 minutes 80 percent of the time.
    - Mt. Pleasant 80th percentile MMR response time: 10.2 minutes (all calls).
    - Charter Township of Union 80th percentile MMR response time: 11.8 minutes (all calls).

Any of the call types MMR is dispatched to can be initially classified as life-threatening or upgraded to life threatening at any time after dispatch.

- CPSM recommends the city and township actively review tri-annual performance benchmarks as presented by MMR to ensure the Isabella County Ambulance Service Agreement performance benchmarks are being met in the city and the township pursuant to the agreement. If the performance benchmarks are not being met, the city and/or township should meet with county officials to discuss improvement with MMR that has a goal of sustaining the ambulance service agreement performance standards for the respective jurisdictions.
- CPSM also recommends, should MMR response times in Mt. Pleasant degrade, and to address response time in the Charter Township of Union, the City and/or the Township may address MMR response time deficiencies through discussion with MMR that may include:
    - Peak Hour Preparedness:
        - Identify and analyze the peak hours with the highest number of runs and ensure that MMR resources are adequately distributed in Mt. Pleasant and the Charter Township of Union during those times to handle increased demand. In Mt. Pleasant and the Township these times are generally 9:00 am to 7:00 pm (highest number of calls on average).
    - Location-Specific Strategies:
        - Assess the factors contributing to variations in response times between Mt. Pleasant and the Charter Township of Union. MMR could consider location-specific ambulance staging strategies to optimize response efficiency.
    - An alternative approach the city and the township together or separately may consider is to solicit private ambulance ground transport services through a Request for Proposal (RFP) process. CPSM recommends if this alternative is chosen, the RFP specifies the terms and conditions for the type of ground transport service sought, that being either a Level of Effort or Level of Performance as outlined next:
        - A "***Level of Effort***" agreement describes the scope of work in general terms and requires the contractor to provide a specified level of effort (number of hours and/or number of units in the response area) over a stated period of time.
        - A ***"Level of Performance"*** agreement specifies desired performance levels for key response time and/or clinical metrics. For example, when mutually agreed upon between both parties could include a specific number of ambulances and performance level indicators (i.e., response time metrics, level of care providers (ALS or BLS), quality improvement/quality insurance metrics involving patient care outcomes, community paramedicine etc.).

Mt. Pleasant Public Safety Facility

Sound community fire-rescue protection requires the strategic distribution of an adequate number of station facilities to ensure that effective service area coverage is achieved, that predicted response travel times satisfy prevailing community goals and national best practices, and that the facilities are capable of supporting mission-critical personnel and vehicle-oriented requirements and needs. Additionally, fire department facilities are exposed to some of the most intense and demanding uses of any public local government facility, as they are occupied and used 24 hours a day.

Personnel - oriented needs in fire facilities must enable performance of daily duties in support of response operations. For personnel, fire facilities must have provisions for vehicle maintenance and repair; storage areas for essential equipment and supplies; and space and amenities for administrative work, training, physical fitness, laundering, meal preparation, and personal hygiene/comfort.

The MPFD operates out of one station, which is shared with the Mt. Pleasant Police Department and is located at 804 E High St. within the City of Mt. Peasant. The facility is otherwise known as the Public Safety Building. All fire staff and apparatus are housed in this facility. The facility is two stories and includes a half basement. The second level is above the apparatus floor. The station has six drive-through apparatus bays (6 front and 6 rear doors). The facility was built in the year 2000 and is 41,446 square feet overall (Police and Fire space). Overall, the facility includes all components necessary for a fire department to operate. CPSM did note bunking arrangements did include separation necessary for privacy and that there is a common locker room/shower area.

Figure 9: Mt. Pleasant Public Safety Facility and Location

MPFD Fleet

The procurement, maintenance, and eventual replacement of response vehicles is one of the largest expenses incurred in sustaining a community's fire-rescue department. While it is the personnel of the MPFD who provide emergency services within the community, the department's fleet of response vehicles is essential to operational success. Modern, reliable vehicles are needed to deliver responders and the equipment/materials they deploy to the scene of dispatched emergencies within the city.

The MPFD has a fleet of frontline heavy fire apparatus as outlined in the next table. Additional fleet includes administrative vehicles and light response vehicles for specialty fire and EMS incidents.

MPFD apparatus maintenance is performed by the city's vehicle maintenance shop and a private vendor that specializes in apparatus-specific maintenance and annual testing. City vehicle maintenance shop work includes regular motor service and light service work that does not involve the fire pump or aerial hydraulic system maintenance and repair. Apparatus-specific work, aerial ladder testing, and annual preventive maintenance and required service is performed by a vendor who specializes in this type of fire apparatus work. This combination of maintenance and repair work is common practice across the country. The intricacies and scope of fire pumps and fire pump controls, aerial ladder hydraulic systems and controls, and apparatus electrical control systems (the main components outside of the motor, chassis, and drive train) are best left in the hands of specialists for diagnosis, maintenance, and repair.

Table 17: MPFD Frontline and Reserve Heavy Apparatus

Unit No.	Year	Make	Type of Cab	Owner
Engine 1	2009	Pierce	Commercial	Mt. Pleasant FD
Engine 2	2011	Pierce	Commercial	Mt. Pleasant FD
Engine 3	2020	Pierce	Commercial	Charter Township of Union
Ladder 1	1997	Simon Duplex/LTI	Custom	Mt. Pleasant FD
Rescue 1	1996	Amtech/Freightliner	Commercial	Mt. Pleasant FD
Tender 1	2002	Luverne/Freightliner	Commercial	Mt. Pleasant FD

NFPA 1901, Standard for Automotive Fire Apparatus, serves as a guide to the manufacturers that build fire apparatus and the fire departments that purchase them. This document is updated every five to eight years (or shorter time periods) using input from the public and industry stakeholders through a formal review process. The committee membership is made up of representatives from the fire service, manufacturers, consultants, and special interest groups. The committee monitors various issues and problems that occur with fire apparatus and attempts to develop standards that address those issues. A primary interest of the committee over the past several cycle updates has been improving firefighter safety and reducing fire apparatus crashes.

The Annex Material in NFPA 1901 (2016) contains recommendations and work sheets to assist in decision making in vehicle purchasing. With respect to recommended vehicle service life, the following excerpt is noteworthy:

> *"It is recommended that apparatus greater than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status and upgraded in accordance with NFPA 1912, Standard for Fire Apparatus Refurbishing (2016), to incorporate as many features as possible of the current fire apparatus standard. This will ensure that, while the apparatus might not totally comply with the current edition of the automotive fire apparatus standards, many improvements and upgrades required by the recent versions of the standards are available to the firefighters who use the apparatus."*

The impetus for these recommended service life thresholds is the continual industry advances in vehicle and occupant safety. Despite good stewardship and maintenance of emergency vehicles in sound operating condition, there are many advances in occupant and vehicle component safety, such as fully enclosed cabs, enhanced rollover protection and air bags, three-point restraints, antilock brakes, increased visibility, cab noise abatement/hearing protection, a clean cab free from carbon products, and a host of other improvements as reflected in each revision of NFPA 1901. These improvements provide safer response vehicles for those providing emergency services within the community, as well those "sharing the road" with these responders.

Annex D of the current NFPA 1912 edition states:

> *To maximize firefighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities. In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901, Standard for Automotive Fire Apparatus have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to firefighters of keeping fire apparatus more than 15 years old in first-line service.*

Under the NFPA1912 standard there are two types of refurbishments a fire department can choose. These are Level 1 and Level 2 refurbishments. According to NFPA 1912, a Level 1 refurbishment includes *the assembly of a new fire apparatus by the use of a new chassis frame, driving and crew compartment, front axle, steering and suspension components, and the use of either new components or components from existing apparatus for the remainder of the of the apparatus.* A Level 2 refurbishment includes *the upgrade of major components or systems of a fire apparatus with components or systems of a fire apparatus that comply with the applicable standards in effect at the time the original apparatus was manufactured.*

A few important points to note regarding the NFPA 1912 standard regarding the refurbishment of heavy fire apparatus. These are:[14]

- Apparatus that was not manufactured to applicable NFPA fire apparatus standards or that is 25 years old should be replaced.

14. NFPA 1912 Standard for Fire Apparatus Refurbishing, 2016 Edition.

- A vehicle that undergoes a Level 1 refurbishing receives a new make and model designation and a new Certificate of Origin for the current calendar year. Apparatus receiving a Level 1 refurbishing are intended to meet the current edition of the NFPA automotive fire apparatus standard. *This is the optimal level of refurbishing*.
- A vehicle that has undergone a Level 2 refurbishing retains its original make and model identification as well as its original title and year of manufacture designation. Apparatus receiving Level 2 refurbishing are intended to meet the NFPA automotive fire apparatus standard in effect when the apparatus was manufactured.

The NFPA 1901 standard states apparatus that was not manufactured to applicable NFPA fire apparatus standards or that is 25 years old should be replaced.

The MPFD's current practice of heavy apparatus replacement is to replace one of the Engines, owned by Charter Township of Union, every twenty years and the remaining two Engines owned by the city to be replaced every twenty-five years. The Ladder and Rescue are documented in MPFD's replacement plan as being replaced after twenty-eight years. The remaining heavy apparatus is the Tender and is documented as being replaced after twenty-five years.

It is common practice throughout the country that smaller vehicles. in the fire service, are replaced when needed instead of a regular replacement plan. Vehicles such as brush, boats and squads can stay in service longer than heavy apparatus due to less use as long as there is a regular maintenance program, and they are inspected yearly for any recalls, damages, corrosion, and wear and tear.

The administrative vehicles should be replaced on a regular cycle since they are driven almost daily. As these vehicle age, maintenance costs may increase, and the availability of parts can be limited. The current practice is these vehicles are replaced when they fall into disrepair and/or cost exceeds the vehicles value. Because the duties of the fire service may differ from other city vehicles, a vehicle should be purchased based on the needs of the fire department in relation to type and style, which includes a command center for incident command activities.

Table 18: MPFD Smaller Vehicles

Make	Year	Unit No.
Ford F550	2007	Squad 2
Ford Taurus	2009	Chief
Ford Crown Vic	2010	Inspections
Ford Explorer	2013	Asst. Chief
Ford F250 4X4	2016	Brush 1
Ford F350 4X4	2016	Squad 1

The remaining fleet consists of trailers utilized for various purposes. Trailers, when properly maintained, can provide years of service. These units generally develop corrosion, rust and rotting of wood material. This is why a thorough examination of these vehicles needs to be performed semi-annually. Because of the uncertainty of the condition and to allow budget forecasting, they should be replaced on a regular schedule.

Table 19: MPFD Trailer Vehicles

Make	Year	Unit No.	License Plate
Southwest Trailer	1999	Tech Res	063X360
Scotty	2001	Training Trailer	771X41
Southwest Trailer	2003	Haz Mat	A371257
United Trailer	2004	Tech Res	063X373
United Express	2005	Utility	809X29
USA trailer	2008	Utility	A289167
Boat trailer			821X73

Recommendations:

- CPSM recommends the MPFD and the city develop, over a one-year period, a fire apparatus replacement plan that follows apparatus age recommendations in accordance with NFPA 1901 standard, *Standard for Automotive Fire Apparatus*.

Planning objectives should include to the extent possible and based on funding:

- First-line apparatus should not exceed 15 years of service on the front line. Once an apparatus reaches this age, it should undergo a Level 1 refurbishing in accordance with NFPA 1912, *Standard for Fire Apparatus Refurbishing* (current standard) as a first alternative, or replacement if maintenance records and wear and tear warrant replacement.
- Apparatus in active/reserve status which is between 20 and 25 years old should comply with NFPA 1901 and undergo a Level 1 refurbishing in accordance with NFPA 1912 as an immediate planning objective if the department plans to continue to use this apparatus. All apparatus at the 25-year-old mark should be considered for replacement. Apparatus greater than 25 years old should be removed from service.
- Combining apparatus types (2 types into1) such as one engine and the rescue into a Rescue Engine. This would avail a multi-purpose apparatus capable of firefighting and technical rescue (a common practice across the country, particularly where staffing is limited). Another alternative is combining one engine with the water tender into a Tender-Engine. This would avail a multi-purpose apparatus capable of initial firefighting with a large water tank and that of a tender, capable of shuttling water to the fire (again, a common practice across the country, particularly where staffing is limited).
- Apparatus components which are either fixed or portable and which require annual testing—fire pumps, aerial ladder and aerial ladder assemblies, ground ladders, self-contained breathing apparatus to include personnel fit-testing, and fire hose—should be tested in accordance with manufacturer and industry specifications and standards, and proper records maintained at the department, the city and with the vendor.

§§§

SECTION 3. COMMUNITY RISK PROFILE

Population and Demographics

The U.S. Census Bureau indicates the population of the City of Mt. Pleasant in 2020 was 21,688. This is an almost 17 percent decrease in population since the 2010 census of 26,016. The city has over 7 square miles of land mass. The population density is 2,809 people per square mile. This is a decrease of 16 percent of people per square mile over the 2010 census numbers.

Additionally, and as a part of this analysis, the U.S. Census Bureau indicates the population of Charter Township of Union in 2020 was 11,699. This is a 10 percent decrease in population since the 2010 census of 12,927. The township has just over 28 square miles of land mass. The population density is 415 people per square mile. This is a decrease of 11 percent of people per square mile over the 2010 census numbers.

In terms of fire and EMS risk, the age and socio-economic profiles of the population can have an impact on the number of requests for fire and EMS services. Evaluation of the number of seniors and children by fire management zones can provide insight into trends in service delivery and quantitate the probability of future service requests. In a 2021 National Fire Protection Association (NFPA) report on residential fires, the following key findings were identified for the period 2015–2019:[15]

- Males were more likely to be killed or injured in home fires than females and accounted for larger percentages of victims (57 percent of the deaths and 55 percent of the injuries).
- The largest number of deaths (19 percent) in a single age group was among people ages 55 to 65.
- 59 percent of the victims of fatal home fires were between the ages of 39 and 74, and three of every five (62 percent) of the non-fatally injured were between the ages of 25 and 64.
- Slightly over one-third (36 percent) of the fatalities were aged 65 or older; only 17 percent of the non-fatally injured were in that age group.
- Children under the age of 15 accounted for 11 percent of the home fire fatalities and 10 percent of the injuries. Children under the age of 5 accounted for 5 percent of the deaths and 4 percent of the injuries.
- Adults of all ages had higher rates of non-fatal fire injuries than children.
- Smoking materials were the leading cause of home fire deaths overall (23 percent) with cooking ranking a close second (20 percent).
- The highest percentage of fire fatalities occurred while the person was asleep or physically disabled and not in the area of fire origin, key factors to vulnerable populations.

In *Mt. Pleasant*, the following age and socioeconomic factors are considered herein when assessing and determining risk for fire and EMS preparedness and response:[16]

- Children under the age of five represent 4.1 percent of the population.
- Persons under the age of 18 represent 11.9 percent of the population.

15. M. Ahrens, R. Maheshwari "Home Fire Victims by Age and Gender," Quincy, MA: NFPA, 2021.
16. U.S. Census Bureau QuickFacts: Mt. Pleasant, MI

- Persons over the age of 65 represent 8.2 percent of the population.
- Female persons represent 51.8 percent of the population.
- There are 2.21 persons per household in Mt. Pleasant.
- The median household income in 2020 dollars was $40,890.
- People living in poverty make up 34.1 percent of the population.
- Persons without health insurance under the age of 65: 7.9 percent.

White alone (not Hispanic or Latino) make up 83.7 percent of the population. Hispanic or Latino represent 5.6 percent of the population. The remaining percentage of population by race includes Black or African American alone at 4.4 percent, Asian alone at 2.8 percent, two or more races at 5.5 percent, and American Indian or Alaska Native alone at 1.9 percent.

In *Charter Township of Union*, the following age and socioeconomic factors are considered herein when assessing and determining risk for fire and EMS preparedness and response:[17]

- Children under the age of five represent 3.2 percent of the population.
- Persons under the age of 18 represent 14.0 percent of the population.
- Persons over the age of 65 represent 9.8 percent of the population.
- Female persons represent 55.1 percent of the population.
- There are 2.34 persons per household in Mt. Pleasant.
- The median household income in 2020 dollars was $35,864.
- People living in poverty make up 37.3 percent of the population.
- Persons without health insurance under the age of 65: 5.6 percent.

White alone (not Hispanic or Latino) make up 86.1 percent of the population. Hispanic or Latino represent 3.9 percent of the population. The remaining percentage of population by race includes Black or African American alone at 3.1 percent, Asian alone at 2.1 percent, two or more races at 4.6 percent, and American Indian or Alaska Native alone at 3.0 percent.

The demographics in Mt. Pleasant overall pose a *moderate risk* in totality. While not a high risk, a single call involving vulnerable population (Fire or EMS) poses a higher risk on that particular response. Through pre-fire planning and response district knowledge of residential and other structures, housing, and vulnerable population as identified above, the MPFD will have the necessary situational awareness and be better prepared on arrival at the incident.

Environmental Risk

The City of Mt. Pleasant and Uniion Charter Township are prone to and will continue to be exposed to certain environmental hazards and risks that may impact the community and which will create response from the MPFD. The most common natural hazards prevalent to the region, according to the Isabella County Hazard Mitigation Action Plan are outlined in the next table. While not all will directy impact Mt. Pleasant and/or Charter Township of Union, all will have effects and or impacts on both.[18]

17. U.S. Census Bureau QuickFacts: Charter Township of Union, MI
18. Isabella County, MI Hazard Mitigation Action Plan, 2022.

Table 20: Isabella County Hazard Ranking Chart

Hazard Type	Impact	Likelihood of Occurrence	Vulnerability	Total Score	Overall Ranking
Severe Winter Weather	4	5	5	14	High
Severe Summer Weather	3	5	3	11	High
Dam Failure	3	4	4	11	High
Riverine Flooding	3	3	3	9	Moderate
Wildfires	1	4	2	7	Moderate
Drought	3	4	2	9	Moderate
Subsidence	1	2	1	4	Low
Earthquake	1	2	1	4	Low

Further description of environmental hazards is outlined below.[19]

- Severe Winter Weather
  - Ice/Sleet Storms
  - Snowstorms
  - Extreme Cold Temperatures

Mt. Pleasant and Charter Township of Union are vulnerable to these hazards.

- Severe Summer Weather
  - Hail
  - Lightning
  - Tornados
  - Severe Winds
  - Fog
  - Extreme Heat Temperatures

Mt. Pleasant and Charter Township of Union are vulnerable to these hazards.

- Dam Failure

This hazard affects those communities within the identified potential inundation areas associated with Dams with Emergency Action Plans (EAPs). The areas in and around Weidman and Lake Isabella are the locations identified with the greatest risk of this hazard due to proximity of High

19. ibid

and Significant Hazard Dams. A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam.

All dams are north and west of Mt. Pleasant and Charter Township of Union. Both have a low vulnerability to this hazard.

- Riverine Flooding

Riverine flooding is defined as the overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt, or ice.

Eight flood incidents were reported by the NCEI for Isabella County, Michigan between 1/1/1950 and 8/31/2022. Over $94 million in property damages and approximately $21 million in crop damages were estimated as a result of these events.

Mt. Pleasant and Charter Township of Union are vulnerable to this hazard as the Chippewa River traverses the city and the township.

- Wildfires

Very little land in Isabella County is identified as forest. The County does not experience many wildfires and has identified them as a medium priority.

Although wildfire impacts can be felt throughout the county, certain areas are more susceptible based on a variety variables. Although nearly the entire county falls within the low burn probability, Mt. Pleasant and Charter Township of Union do have wildland interface and wildland intermix areas identified in the Isabella County Hazard Mitigation Plan. Overall, however, the burn probability in the county is low.

- Drought

Drought is the consequence of a reduction in the amount of precipitation that was expected over an extended period of time, usually a season or more in length. The severity of a drought depends not only on its location, duration, and geographical extent, but also on the water supply demands made by human activities and vegetation.

As 25 percent of Isabella County consists of forested lands, the biggest problem drought presents is the increased threat of wildfire.

Mt. Pleasant and Charter Township of Union are vulnerable to this hazard.

- Subsidence

Subsidence is the lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support. In Michigan, the primary cause of subsidence is underground mining. Although mine subsidence is not as significant a hazard in Michigan as in other parts of the country, many areas in Michigan are potentially vulnerable to mine subsidence hazards. Mine subsidence is a geologic hazard that can strike with little or no warning and can result in very costly damage.

Isabella County has not experienced any cases of subsidence on record. However, with the number of mines that exist and have been abandoned, it could be possible for a future occurrence(s) of subsidence to occur in the County.

- Earthquake

This hazard has an equal chance of affecting all jurisdictions within Isabella County.

No severely destructive earthquake has ever been documented in Michigan. However, several mildly damaging earthquakes have been felt since the early 1800s. Isabella County is not in an area designated as high risk to ground movement

The greatest impact on Isabella County would probably come from damage to natural gas and petroleum pipelines. This includes Mt. Pleasant and Charter Township of Union.

Building and Target Hazard Risk

A community risk and vulnerability assessment will evaluate the community, and regarding buildings, it will review all buildings and the risks associated with each property and then classify the property as either a high, medium, or low-hazard depending on factors such as the life and building content hazard and the potential fire flow and staffing required to mitigate an emergency in the specific property. According to the NFPA *Fire Protection Handbook*, these hazards are defined as:

High-hazard occupancies: Schools, hospitals, nursing homes, explosives plants, refineries, high-rise buildings, and other high life-hazard (vulnerable population) or large fire-potential occupancies.

Medium-hazard occupancies: Apartments, Condos, mixed use residential, offices, and mercantile and industrial occupancies that may require extensive rescue by firefighting forces.

Low-hazard occupancies: One-, two-, or three-family dwellings and scattered small business and industrial occupancies.[20]

Mt. Pleasant has the following building types:

- Single family housing units: 3,301.
- Multifamily housing units (townhomes, duplexes, etc.): 415.
- Apartment building units–garden style (2 + stories): 702.
- Resident Halls-CMU: 24
- Commercial/industrial structures: 4,813
- Commercial/industrial structures-CMU: 50
- High Rise-75' or more in height: 2.
- High Rise-75' or more in height-CMU: 8

*Included in this count: 13 buildings that are 4 or more **stories but under 75'***

Charter Township of Union has the following building types:

- Single family housing units: 1,974 (largest building type in the township).
- Multifamily housing units (townhomes, duplexes, etc.): 146.
- Apartment building units–garden style (2 + stories): 114.
- Commercial/industrial structures: 5,963.

In both the city and the township, the largest building count is commercial/industrial structures.

20. Cote, Grant, Hall & Solomon, eds., *Fire Protection Handbook* (Quincy, MA: National Fire Protection Association, 2008), 12.

In terms of identifying target hazards, consideration must be given to the activities that take place (public assembly, life safety vulnerability, manufacturing, processing, etc.), the number and types of occupants (elderly, youth, handicapped etc.), and other specific aspects related to the construction of the structure.

Mt. Pleasant and Charter Township of Union have a variety of target hazards that have been assigned a hazard class by the MPFD and which include:

High Hazard

- Hospital (2 in the City: McClaren Central; My Michigan Medical Center-Mt. Pleasant).
- Commercial facilities that include assisted living/nursing/development disability.
- Residential facilities for senior/assisted living.
- Public and private educational and day care facilities.
- Facilities classified as high hazard due to processes/hazardous materials use.
- Petroleum Products Pipeline Transportation Facilities (2)

Medium Hazard

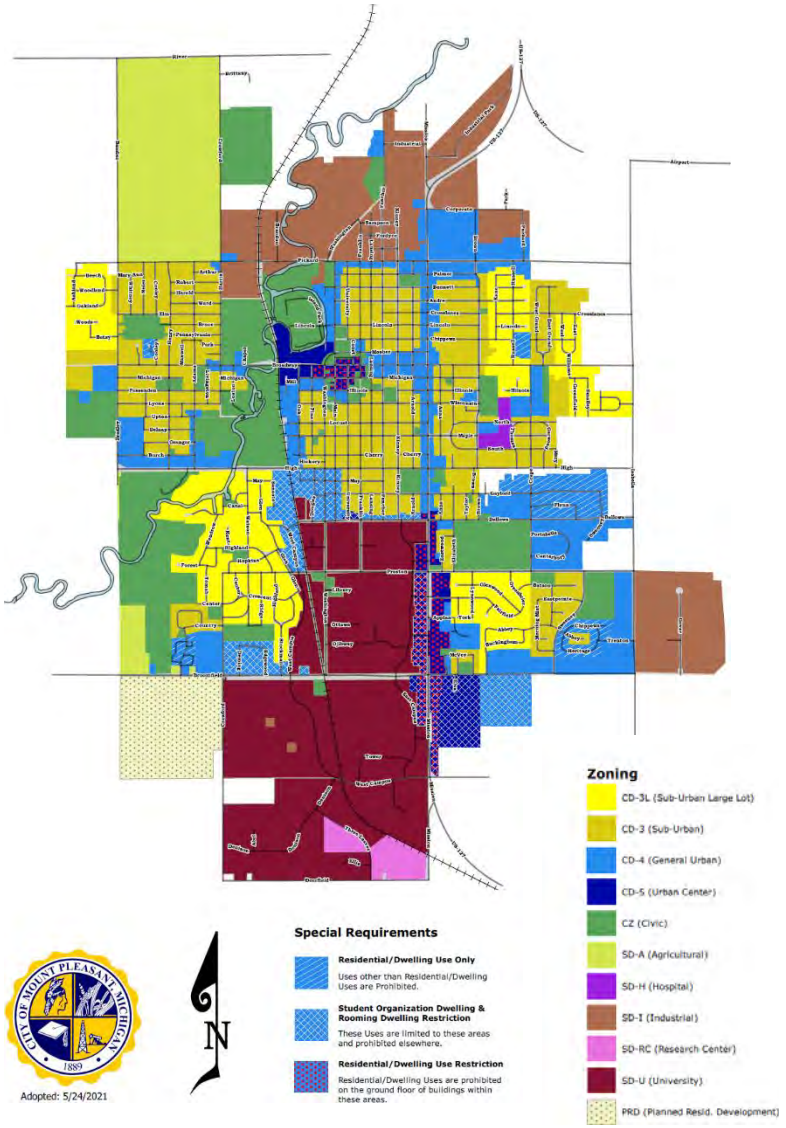
- Commercial/Mercantile properties that store or use materials that are flammable and/or hazardous.
- Businesses/Occupancies classified as Public Assembly.
- Shopping centers/retail suites/strip malls.
- Mixed Use buildings with residential over retail.
- Large footprint buildings.
- Medical facilities.
- Single Family-Dwellings over 3,000 square feet, particularly those built with light frame construction-with or without a basement.

The greatest amount of building risk with life-safety hazards in Mt. Pleasant and Charter Township of Union is of a low hazard (single family dwellings-predominately wood frame construction). Mt. Pleasant does have high risk/vulnerable population risks (nursing/assisted living facilities, hospital, medical facilities), educational facilities, multifamily residential structures (apartments and rersident halls at CMU). All of these building risks present the MPFD with life-safety concerns. The industrial and mercantile building risk, and larger footprint commercial buildings while a lower life safety risk, is generally a higher hazard risk based on processes, storage, and overall occupancy type.

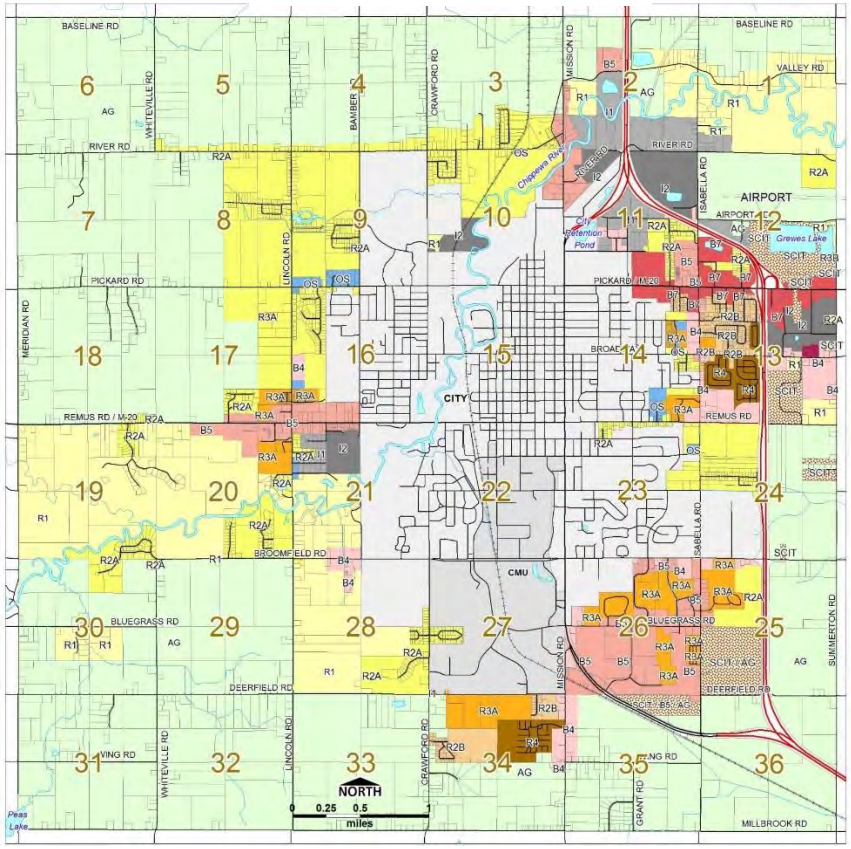
The next map set illustrates the land use for Mt. Pleasant and Charter Township of Union, which links to building risks outlined above.

Figure 10: Mt. Pleasant and Charter Township of Union Land Use

City of Mt. Pleasant



Charter Township of Union



CHARTER TOWNSHIP OF UNION
ZONING MAP - Through Ordinance No. 22-04

- AG, Agricultural District
- R-1, Rural Residential District
- R-2A, One- and Two-Family, Low-Density Residential District
- R-2B, One- and Two-Family, Medium-Density Residential District
- R-3A, Multiple-Family Residential District
- R-3B, Medium-Density Multiple-Family Residential District
- R-4, Mobile Home Park District
- B-4, General Business District
- B-5, Highway Business District
- B-7, Retail and Service Highway Business District
- I-1, Light Industrial District
- I-2, General Industrial District
- OS, Office Service District
- PUD, Planned Unit Development District
- SCIT, Saginaw Chippewa Indian Tribe Trust & Fee Lands
- CITY, City of Mt. Pleasant
- CMU, Central Michigan University

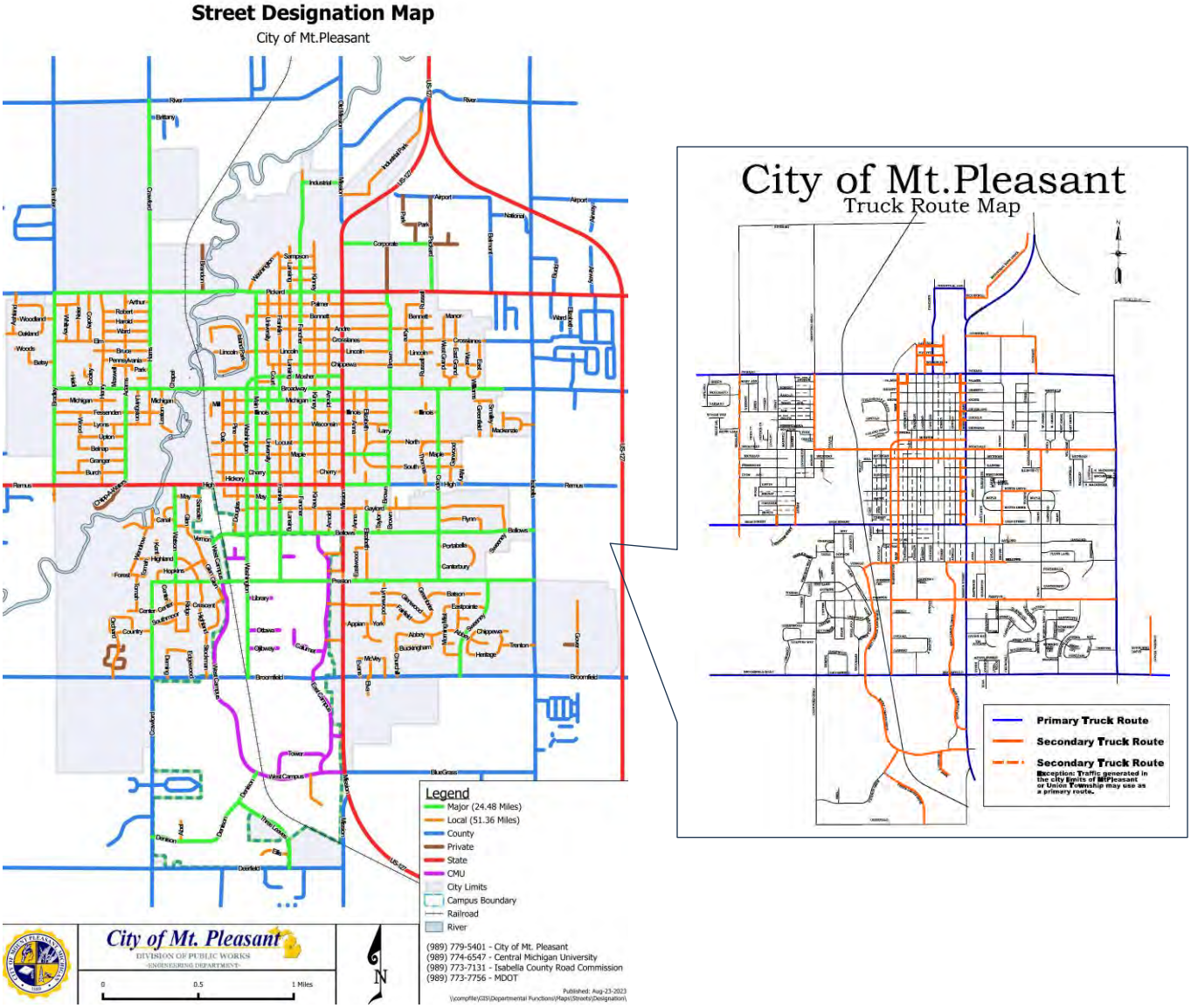
Transportation Risk

The Mt. Pleasant road transportation system is typical of suburban/urban municipalities and includes:

- Arterials: High to moderate traffic volumes with moderate speeds. Connects different areas of the city.
- Collectors: Provide access to and from neighborhoods and commercial areas with moderate volume and moderate speed.
- Local roads: provides access to residential and businesses with low volume and low speed; 2 lanes.

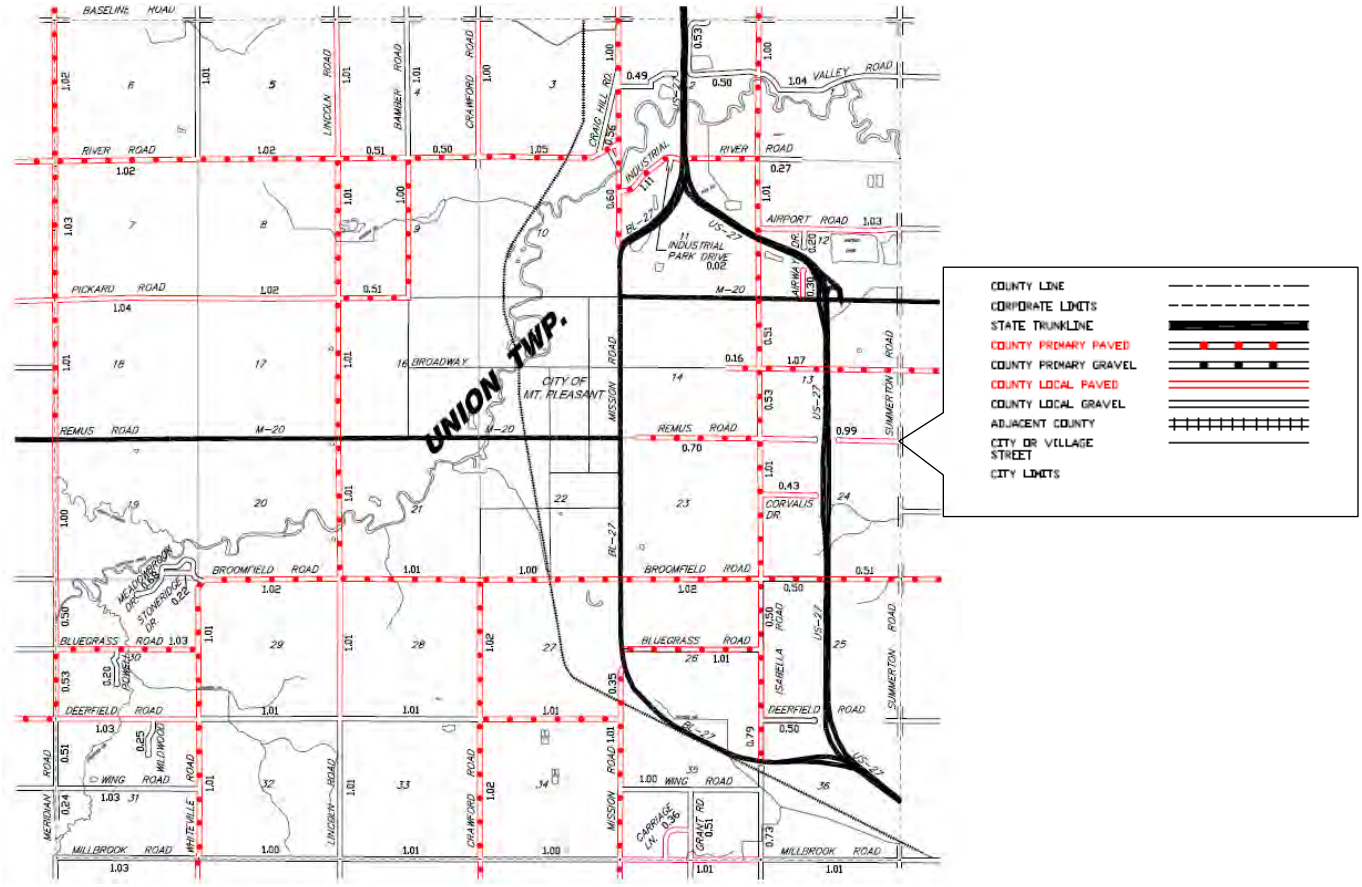
The city uses the terms major, local, county, and state designations for the road system in the city as illustrated next.

Figure 11: Mt. Pleasant Primary Road Network and Truck Route map



The road network in the Charter Township of Union includes county primary paved roads (major collector and minor arterial), county local paved roads, county primary gravel roads, and county local gravel roads. Additionally, State Road 127 (four lane divided freeway) runs north-south through the township.

Figure 12: Charter Township of Union Primary Road Network[21]



The road and transportation network described herein for Mt. Pleasant and Charter Township of Union poses risks for a vehicular accident, some at medium to greater than medium speeds, as well as vehicular-versus-pedestrian risks. There are additional transportation risks since tractor-trailers and other commercial vehicles traverse the roadways of Mt. Pleasant to deliver mixed commodities to business locations. Fires involving these products can produce smoke and other products of combustion that may be hazardous to health.

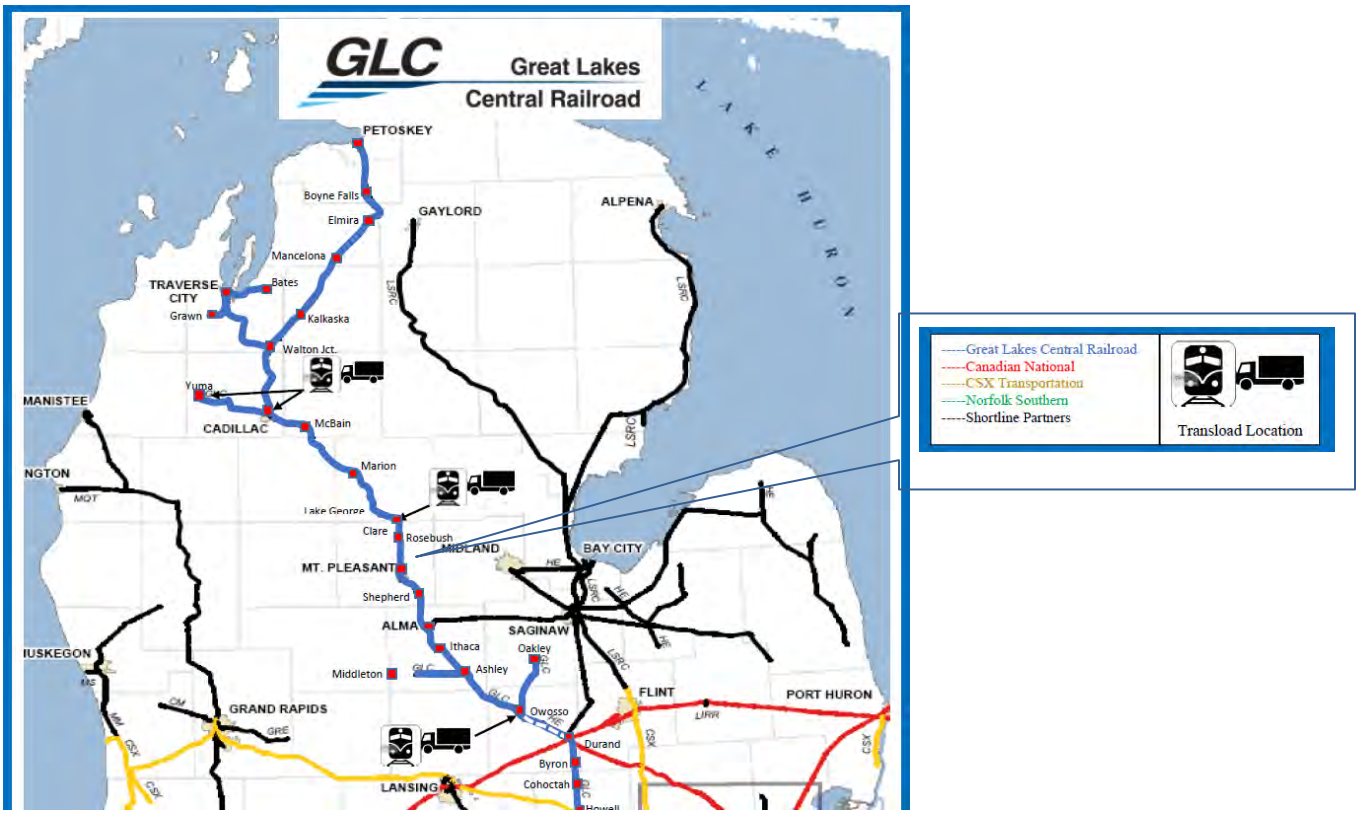
Mt. Pleasant and the Charter Township of Union also have rail transportation risks. Freight rail includes north-south track through the city and the township. Great Lakes Regional Railroad operates freight service along this track with loads that include: chemicals (some hazardous); lumber and lumber products; plastics and glycol; textiles; fertilizer; grain; and aggregates such as clay and sand.

A future passenger rail service plan is under development for northern Michigan which will include a stop in Mt. Pleasant.

21. Isabella County, MI Road Commission

Fires involving the potential commodities passing through and stored in sidings in Mt. Pleasant can produce smoke and other products of combustion risks that may be hazardous to health. Hazardous materials (existing or waste) themselves present hazards to health risks if being transported and involved in a rail accident. Additionally, there are at-grade vehicle/rail crossings in the city and the township, presenting rail-vehicle and rail-pedestrian risks.

Figure 13: Great Lakes Central Railroad Track Map



Fire and EMS Incident Risk

An indication of the community's overall Fire and EMS risk is the type and number of Fire and EMS-related incidents the Fire and EMS department responds to. CPSM conducted a data analysis for this project that included MPFD unit's incident response types and workload.

The next two tables detail the call types and call type totals for these types of fire-related risks between May 1, 2022, and April 30, 2023. During this time period MPFD responded to 1,006 overall calls for service.

The first table outlines all calls responded to by MPFD.

The second table outlines calls by MPFD service area (Mt. Pleasant and the Charter Township of Union).

Table 21: MPFD Fire and EMS Calls by Type: Mt. Pleasant and Charter Township of Union

Call Type	Total Calls	Calls per Day
Medical and other	298	0.8
MVA	99	0.3
EMS subtotal	397	1.1
False alarm	212	0.6
Good intent	19	0.1
Hazard	148	0.4
Outside fire	28	0.1
Public service	85	0.2
Structure fire	36	0.1
Technical rescue	11	0.0
Fire subtotal	539	1.5
Canceled	62	0.2
Mutual aid	8	0.0
Total	1,006	2.8

- 39.5 percent of the Fire and EMS calls are EMS related.
- Motor vehicle accidents make up 25 percent of EMS related calls.

- 54 percent of the Fire and EMS calls are Fire related.
- 6 percent of Fire and EMS calls are cancelled prior to responding or while enroute.
- Hazard, Structure and Outside fire calls make up 39 percent of Fire calls.
- False alarms make up 39 percent of fire related calls.
- Public Service and Good Intent calls make up 19 percent of fire related calls.

Table 22: Annual Workload by Area

Area	Calls	Percent Calls	Runs	Runs Per Day	Percent Work
Mt. Pleasant	612	60.8	750	2.1	59.7
Charter Twp of Union	386	38.4	492	1.3	37.1
Outside Service Area	8	0.8	21	0.1	3.2
Total	1,006	100.0	1,263	3.5	100.0

The largest percentage of MPFD unit responses are in the Mt. Pleasant zone.

The next table details the MMR EMS call types and transport analysis for these types of EMS-related risks between May 1, 2022, and April 30, 2023. During this time period MMR responded to 4,729 runs in the Mt. Pleasant/Charter Township of Union service areas.

The first tables outline calls by MMR service area (Mt. Pleasant and the Charter Township of Union). The second table outlines all call types responded to by MMR in the service area (Mt. Pleasant and the Charter Township of Union).

Table 23: MMR Runs by Location

Location	Run Count	Percent Runs	Runs Per Day
Mt. Pleasant	3,046	64.4	8.3
Union Township	1,683	35.6	4.6
Total	4,729	100.0	13.0

The largest percentage of MMR unit responses are in the Mt. Pleasant zone.

Table 24: MMR EMS Calls by Type: Mt. Pleasant and Charter Township of Union

Run Type	Total Runs	Percent of Total	Arriving Runs	Arriving Rate	Transport Runs	Transport Rate
Breathing difficulty	465	9.8	444	95.5	346	74.4
Cardiac and stroke	543	11.5	518	95.4	374	68.9
Fall and injury	1,043	22.1	967	92.7	562	53.9
Illness and other	1,439	30.4	1,335	92.8	986	68.5
MVA	229	4.8	205	89.5	110	48.0
Overdose and psychiatric	458	9.7	369	80.6	297	64.8
Seizure and unconsciousness	552	11.7	512	92.8	377	68.3
Total	4,729	100.0	4,350	92.0	3,052	64.5

92% of all runs had an arriving MMR unit. Average of 12/day.

64.5% of all runs converted to a transport. Average of 8.4/day.

Falls and Injury/Illness and Other make up the highest percentage of MMR runs. 52%

MVAs had the lowest transport rate. 48%

MPFD Resiliency

Resiliency is an organization's ability to quickly recover from an incident or event, or to adjust easily to changing needs or requirements. Greater resiliency can be achieved by constant review and analysis of the response system and focuses on three key components:

- Resistance: The ability to deploy only resources necessary to control an incident and bring it to termination safely and effectively.
- Absorption: The ability of the agency to quickly add or duplicate resources necessary to maintain service levels during heavy call volume or incidents of high resource demand.
- Restoration: The agency's ability to quickly return to a state of normalcy.

For the CPSM data analysis study period, MPFD Fire and EMS units responded to 1,006 calls for service. The following tables and figure analyze MPFD resiliency. In this analysis, CPSM included all calls that occurred inside and outside of the MPFD service area (to include cancelled calls). We did this because responses outside of the city (although few) and canceled calls impact the resiliency of the department to respond to calls.

The first table examines the workload in terms of MPFD units. Engines 31, 32, and 33 have the highest workload. The primary response units are the three engines the MPFD operates. These units together average just under 30-minutes per run. The Rescue Unit and Tender are specialty units. Specialty units typically average longer minutes per run because of the service level provided (Tenders shuttling water in non-hydrant areas; Rescue units due to the equipment carried and complexity of calls).

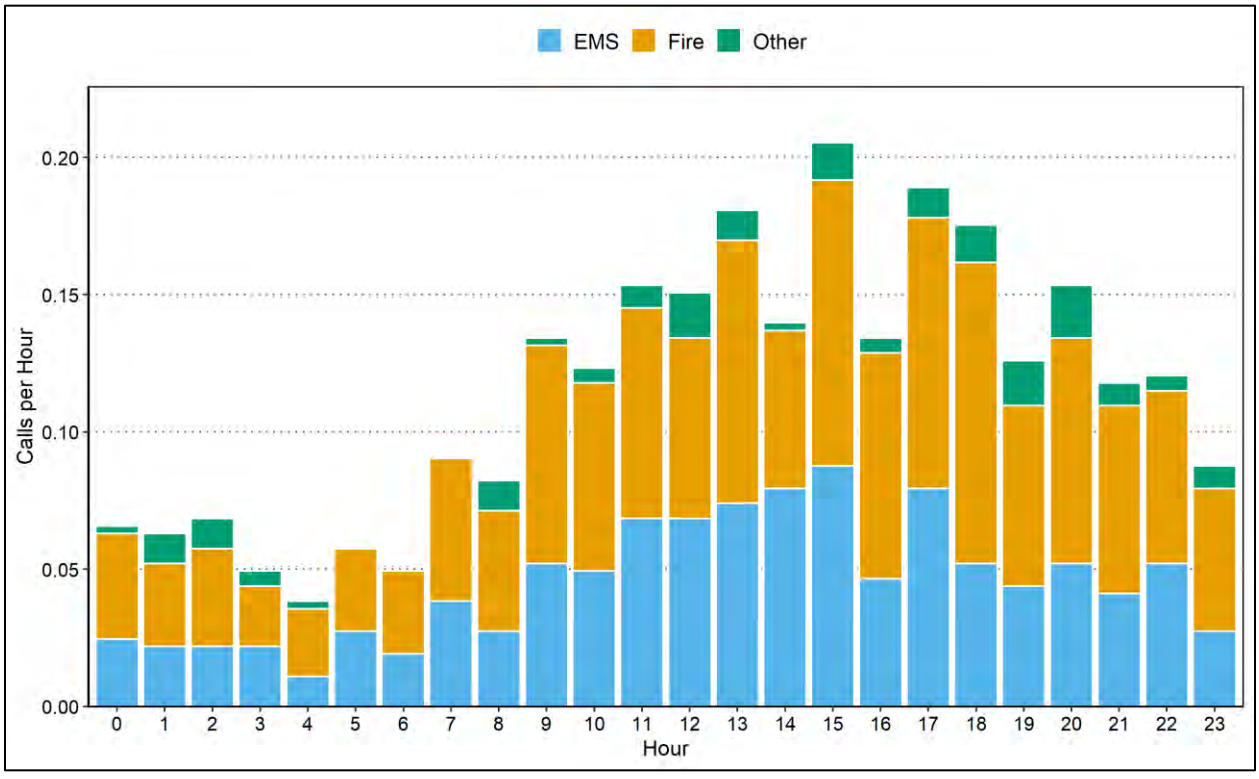
Table 25: Unit Workload (Runs) *Primary Units Highlighted*

Unit	Type	Minutes Per Run	Runs	Runs Per Day
AC31	Chief officer	98.5	20	0.1
B31	Brush truck	40.9	11	0.0
C31	Fire marshal	42.0	77	0.2
Chief	Chief officer	139.4	15	0.0
ENG31	Engine	29.0	332	0.9
ENG32	Engine	26.4	365	1.0
ENG33	Engine	28.8	295	0.8
POV	POV	211.3	5	0.0
R31	Rescue unit	76.7	74	0.2
SCH31	Crown VIC	100.5	25	0.1
SG31	Utility	27.1	13	0.0
T31	Tender	78.8	22	0.1
Other	Other	102.5	9	0.0
Total		37.8	1,263	3.5

Engines 31, 32, and 33 essentially operate as one unit based on staffing and unit rotation.

The next figure looks at when calls are occurring over a 24-hour period. In Mt. Pleasant, the more probable time for calls is between the hours of 9:00 a.m. and 9:00 pm.

Figure 14: Average Calls by Hour of Day



The next resiliency measure is the frequency distribution of calls, or how many calls are occurring in an hour. The next table tells us that across the service area, just under 10 percent of the time there is one overlapping call and just under 1 percent of the time there are two or more concurrent or overlapping calls.

Table 26: Frequency Distribution of the Number of Calls

Calls in an Hour	Frequency	Percentage
0	7,831	89.4
1	858	9.8
2+	71	0.8
Total	8,760	100.0

The next table examines the frequency of overlapping calls, which is an additional data point utilized when analyzing resiliency. In review of this table, 94 percent of the time, there were no MPFD overlapping calls. Just under 6 percent of the time there was one overlapping calls, and only twice in the one-year data analysis period was there 2 overlapping calls.

Table 27: Frequency of Overlapping Calls

Scenario	Number of Calls	Percent of All Calls	Total Hours
No overlapped call	947	94.1	438.7
Overlapped with one call	57	5.7	15.9
Overlapped with two calls	2	0.2	0.1

The next two figures examine the number of arriving units (typically dispatched to a call).

- 86 percent of fire calls had one unit that arrived.
- 80 percent of EMS calls had one unit that arrived.
- 9 percent of fire calls had two units that arrived.
- 16 percent of EMS calls had two units that arrived.
- 5 percent of fire calls had three or four units that arrived.
- 4 percent of EMS calls had three or four units that arrived.

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Figure 15: Number of Arriving MPFD Units for Fire Calls

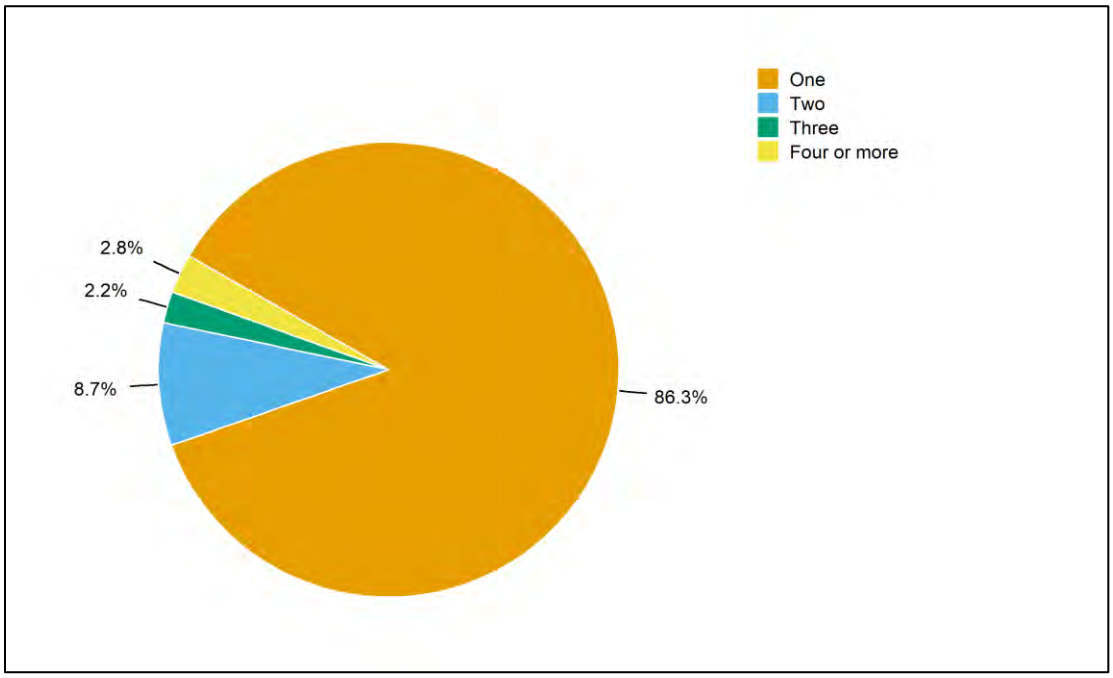
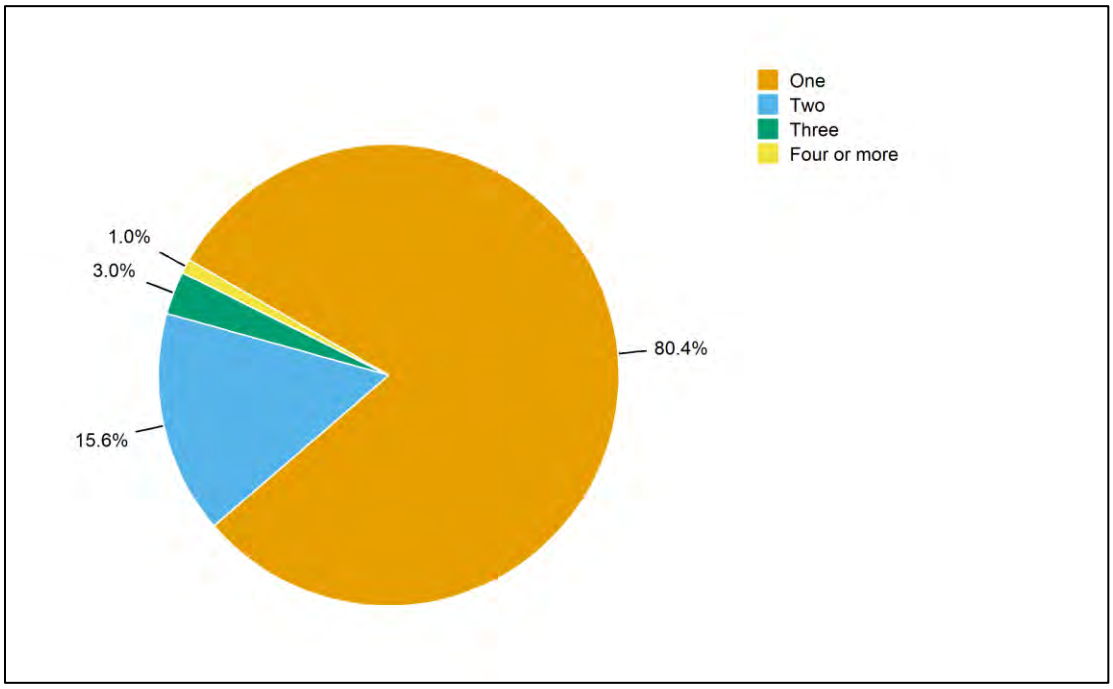


Figure 16: Number of Arriving MPFD Units for EMS Calls



Overall, the MPFD does not have resiliency issues on the surface. Concurrent calls are infrequent, the average time on a call for the primary response engine units is below 30 minutes, the highest frequency of calls in an hour is zero, and total calls in a day is just below three, or one call every eight hours. Addtionally, and based on the response protocols as outlined in Standard Operating Procedure 1.8, there is not a resistance issue either.

The MPFD's ability to absorb multiple calls and restore response capabilities to a state of normal can be challenging at certain times such as during working structural fires and other multi-company responses (runs). Additionally, and below the surface, the ability of the MPFD to respond to multiple calls when they do occur, and to respond additional apparatus on multi-unit and working fire and rescue calls is dependent on career staffing (minimum above two when available) and the availability of the POC response force.

Three-Axis Risk Analysis

A comprehensive risk assessment is a critical aspect of assessing and creating a deployment analysis to meet the community's risk and can assist the MPFD in quantifying the risks that it faces. Once those risks are known and understood, the department is better equipped to determine if the current response resources are sufficiently staffed, equipped, trained, and positioned.

Risk is often categorized in three ways: the probability the event will occur in the community, the impact on the fire department, and the consequence of the event on the community. The following three Tables look at the probability of the event occurring, which ranges from unlikely to frequent; consequence to the community, which is categorized as ranging from insignificant to catastrophic; and the impact to the organization, which ranges from insignificant to catastrophic.

Table 28: Event Probability

Probability	Chance of Occurrence	Description	Risk Score
Unlikely	2%-25%	Event may occur only in exceptional circumstances.	2
Possible	26%-50%	Event could occur at some time and/or no recorded incidents. Little opportunity, reason, or means to occur.	4
Probable	51%-75%	Event should occur at some time and/or few, infrequent, random recorded incidents, or little anecdotal evidence. Some opportunity, reason, or means to occur; may occur.	6
Highly Probable	76%-90%	Event will probably occur and/or regular recorded incidents and strong anecdotal evidence. Considerable opportunity, means, reason to occur.	8
Frequent	90%-100%	Event is expected to occur. High level of recorded incidents and/or very strong anecdotal evidence.	10

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Table 29: Consequence to Community Matrix

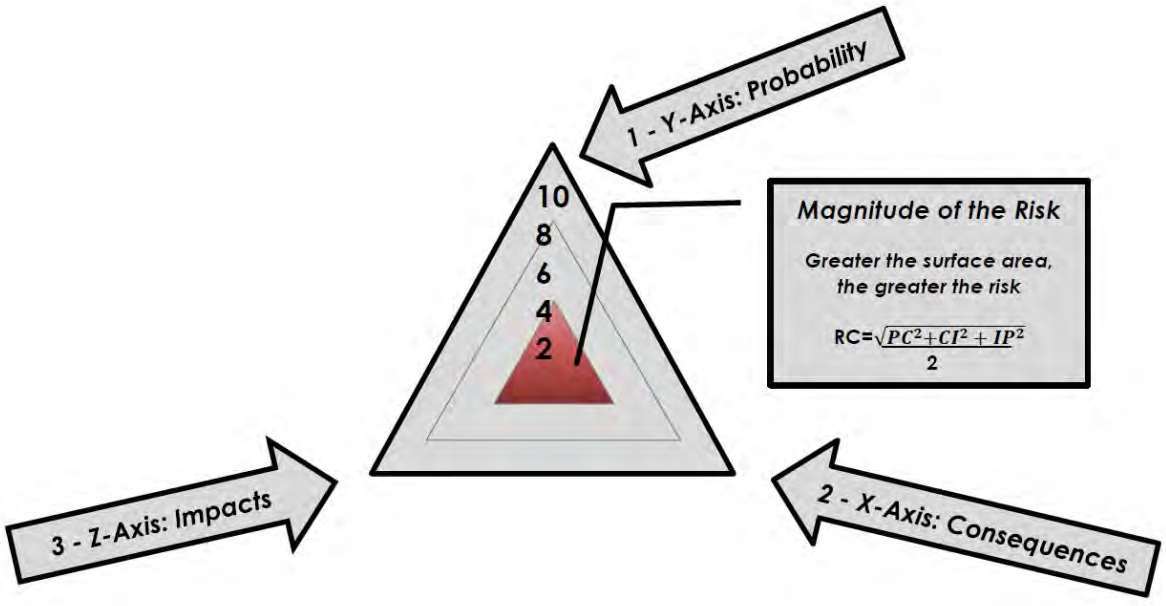
Impact	Consequence Categories	Description	Risk Score
Insignificant	Life Safety	■ 1 or 2 people affected, minor injuries, minor property damage, and no environmental impact.	2
Minor	Life Safety Economic and Infrastructure Environmental	■ A small number of people were affected, no fatalities, and a small number of minor injuries with first aid treatment. Minor displacement of people for <6 hours and minor personal support required. ■ Minor localized disruption to community services or infrastructure for <6 hours. Minor impact on environment with no lasting effects.	4
Moderate	Life Safety Economic and Infrastructure Environmental	■ Limited number of people affected (11 to 25), no fatalities, but some hospitalization and medical treatment required. Localized displacement of small number of people for 6 to 24 hours. Personal support satisfied through local arrangements. Localized damage is rectified by routine arrangements. ■ Normal community functioning with some inconvenience. Some impact on environment with short-term effects or small impact on environment with long-term effects.	6
Significant	Life Safety Economic and Infrastructure Environmental	■ Significant number of people (>25) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization. ■ A large number of people were displaced for 6 to 24 hours or possibly beyond. External resources required for personal support. Significant damage that requires external resources. Community only partially functioning, some services unavailable. Significant impact on environment with medium- to long-term effects.	8
Catastrophic	Life Safety Economic and Infrastructure Environmental	■ A very large number of people in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization; serious injuries with long-term effects. General and widespread displacement for prolonged duration; extensive personal support required. Extensive damage to properties in affected area requiring major demolition. ■ Serious damage to infrastructure. Significant disruption to, or loss of, key services for a prolonged period. ■ Community unable to function without significant support. ■ Significant long-term impact on environment and/or permanent damage.	10

Table 30: Impact on MPFD

Impact	Impact Categories	Description	Risk Score
Insignificant	Personnel and Resources	One apparatus out of service for period not to exceed one hour.	2
Minor	Personnel and Resources	More than one but not more than two apparatus out of service for a period not to exceed one hour.	4
Moderate	Personnel and Resources	More than 50 percent of available resources committed to incident for over 30 minutes.	6
Significant	Personnel and Resources	More than 75 percent of available resources committed to an incident for over 30 minutes.	8
Catastrophic	Personnel, Resources, and Facilities	More than 90 percent of available resources committed to an incident for more than two hours or event which limits the ability of resources to respond.	10

Prior risk analysis has only evaluated two factors of risk: probability and consequence. Contemporary risk analysis considers the impact of each risk to the fire and EMS organization, thus creating a three-axis approach to evaluating risk as depicted in the following Figure. A contemporary risk analysis now includes probability, consequences to the community, and impact on the organization, in this case the MPFD. In this analysis, information presented and reviewed in this section (Community Risk Profile) has been considered. Risk is categorized as Low, Moderate, High, or Special.

Figure 17: Three-Axis Risk Calculation (RC)



The following factors/hazards were identified and considered:

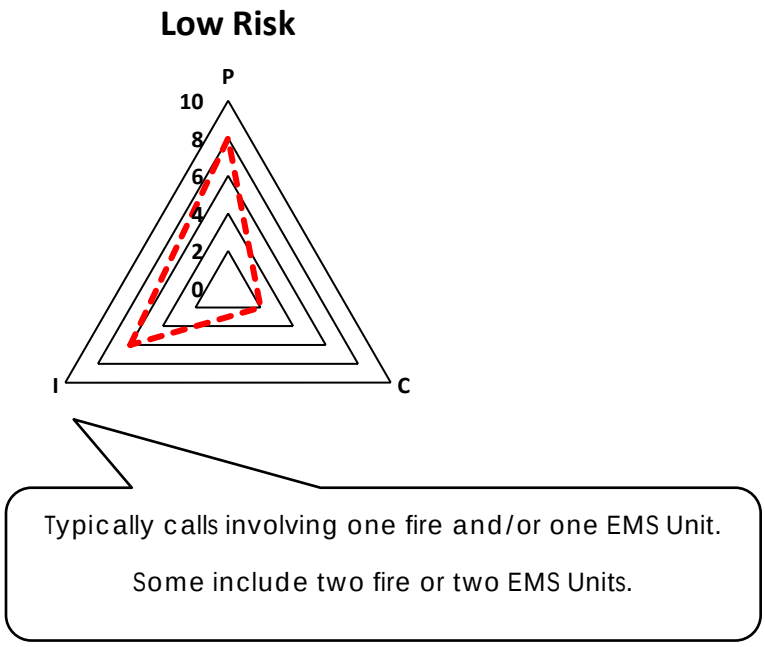
- Demographic factors such as age, socio-economic, vulnerability.
- Natural hazards such as flooding, snow and ice events, wind events, summer storms.
- Manufactured hazards such as transportation risks (road and rail) and target hazards.
- Structural/building risks.
- Fire and EMS incident numbers and density.
- Resiliency.

The assessment of each factor and hazard as listed below took into consideration the likelihood of the event, the impact on the city itself, and the impact on MPFD's ability to deliver emergency services, which includes MPFD resiliency and mutual aid capabilities as well. The list is not all inclusive but includes categories most common or that may present to the MPFD service area and the MPFD.

Low Risk

- Automatic fire/false alarms.
- Low-acuity BLS EMS Incidents.
- Low-risk environmental event.
- Motor vehicle accident (MVA)-no entrapment, 1-2 patients, low hazards.
- Good intent/hazard/public service fire incidents with no life-safety exposure.
- Outside fires such as grass, rubbish, dumpster, vehicle with no structural/life-safety exposure.
- Low-acuity surface water incident.

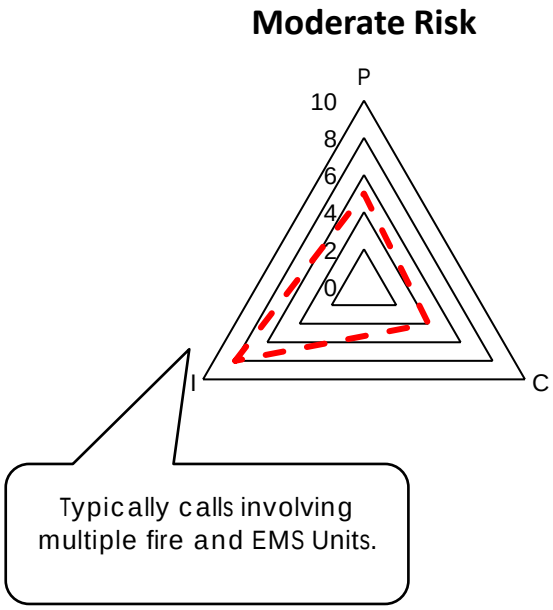
Figure 18: Low Risk



Moderate Risk

- Fire incident in a single-family dwelling where fire and smoke or smoke is visible, indicating a working fire.
- Suspicious substance investigation involving multiple fire companies and law enforcement agencies.
- MVA with entrapment of passengers.
- Grass/brush fire with structural endangerment/exposure.
- Low-angle rescue involving ropes and rope rescue equipment and resources.
- Higher-acuity surface water incident.
- Good intent/hazard/public service fire incidents with life-safety exposure.
- Rail or road transportation event with no release of product or fire, and no threat to life safety

Figure 19: Moderate Risk



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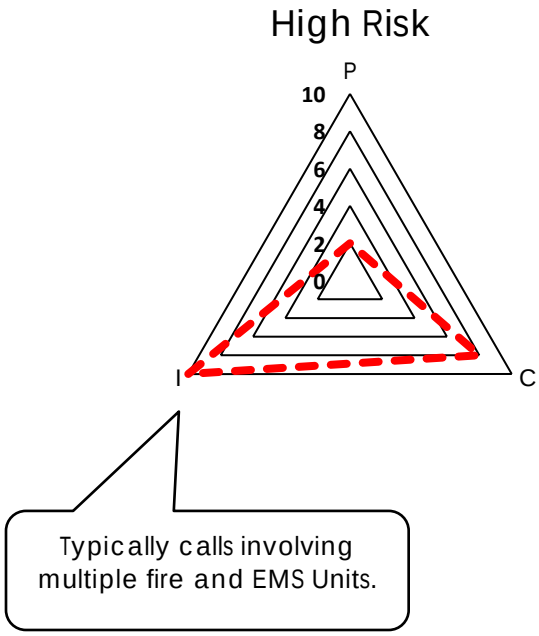
High Risk

- Working fire in a target hazard.
- Cardiac arrest.
- Mass casualty incident of more than 10 patients but fewer than 25 patients.
- Confined space rescue.
- Structural collapse involving life-safety exposure.
- High-angle rescue involving ropes and rope rescue equipment.
- Trench rescue.
- Suspicious substance incident with multiple injuries.
- Industrial leak of hazardous materials that causes exposure to persons or threatens life safety.
- Weather events that create widespread flooding, heavy snow or ice, heavy winds, building damage, and/or life-safety exposure.

Figure 20: High Risk



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SECTION 4. OPERATIONAL AND DEPLOYMENT ANALYSIS

Staffing and Deploying Fire Resources

When exploring staffing and deployment of fire departments it is prudent to design an operational strategy around the actual circumstances that exist in the community and the fire and risk problems that are identified. The strategic and tactical challenges presented by the varied hazards that a department protects against need to be identified and planned for through a community risk analysis planning and management process *as completed in this report.*

Effectively managing a fire department requires an understanding of and an ability to demonstrate how changes to resources will affect community outcomes. It is imperative that fire department leaders, as well as policy makers, know how fire department resource deployment in their local community affects community outcomes in three important areas: firefighter injury and death; civilian injury and death; and property loss. If fire department resources (both mobile and personnel) are deployed to match the risk levels inherent to hazards in the community, it has been scientifically demonstrated that the community will be far less vulnerable to negative outcomes in all three areas.[22]

Staffing and deployment of fire services is not an exact science. While there are many benchmarks that communities and management utilize in justifying certain staffing levels, there are certain considerations that are data driven and reached through national consensus (NFPA Standards, Fire Accreditation through the Commission of Fire Accreditation International, and ISO-PPC benchmarking that serve this purpose as well.

In addition to these considerations, staffing is also linked to station location, demand for service, and what type of apparatus is responding such as an engine, ladder, ambulance, or specialty piece. CPSM takes a wholistic approach when evaluating staffing and deployable resources, and when making staffing and deployment recommendations. These include:

Fire Risk and Vulnerability of the Community: The community risk and vulnerability assessment are used to evaluate potential risks, hazards, and community vulnerabilities, to include those evaluated in a community's Hazard Mitigation Planning. With regard to individual or groups of buildings, the assessment is used to measure the risk associated with the building(s) and then segregate the building(s) as either a high, medium, or low hazard depending on factors such as the life and building content hazard, the potential fire flow required to mitigate a fire, and the staffing and apparatus types required to mitigate an emergency at the specific property. Included in the community risk assessment should be both a structural and nonstructural (weather, wildland-urban interface, transportation routes, and community infrastructure) analysis that again, segregates risk into a high, medium, or low risk category.

Population and Demographics of a Community: Population, demographics, and population density drive calls for local government service, particularly public safety. The risk from fire is not the same for everyone, with studies telling us age, gender, race, economic factors, and what region in the country one might live, all contribute to the risk of death from fire. Studies also tell us these same factors affect demand for EMS, particularly population increase and access to care

22. Fire Service Deployment, Assessing Community Vulnerability, Metropolitan Chiefs, 2011.

challenges for vulnerable population. Many uninsured or underinsured patients rely on emergency departments for their primary and emergent care, utilizing pre-hospital EMS transport systems as their entry point.

Call Demand: Demand includes the types of calls to which fire and EMS units are responding to, the frequency, and the location of the calls. Demand drives workload and station staffing and location considerations. Higher population centers with increased demand require greater resources. High demand affects the resiliency of fire and EMS departments, which can translate into longer response times.

Workload of Units: The types of calls to which units are responding and the workload of each unit in the deployment model. This tells us what resources are needed and where; it links to demand and station location, or in a dynamic deployed system, the area(s) in which to post units. The higher the workload, the more effect it has on the resiliency of the department.

Travel Times from Fire Stations: The ability to cover the response area/district in a reasonable and acceptable travel time when measured against national benchmarks. Links to demand, risk assessment, resiliency.

NFPA Standards, ISO-PPC, OSHA requirements (and other national benchmarking): CPSM considers national benchmarks, standards, and applicable laws when making recommendations or alternatives regarding the staffing and deployment of fire and EMS resources.

EMS Demand: Community demand; demand on available units and crews; demand on non-EMS units responding to calls for service (fire/police units); availability of crews in departments that utilize cross-trained EMS staff to perform fire suppression.

Critical Tasking: The ability of a fire and EMS department to collect an Effective Response Force as benchmarked against national standards when confronted with the need to perform required critical tasks on a fire or EMS incident scene defines its capability to provide adequate resources to mitigate each event. Department-developed and measured against national benchmarks. Links to risk and vulnerability analysis.

Community Expectations: Measuring, understanding, and meeting community expectations.

Ability to Fund: The community's ability and willingness to fund all local government services and understanding how the revenues are divided up to meet the community's expectations.

While each component presents its own metrics of data, consensus opinion, and/or discussion points, aggregately they form the foundation for informed decision making geared toward the implementation of sustainable, data- and theory-supported, effective fire and EMS staffing and deployment models that fit the community's profile, risk, and expectations.

Deployable Resources

MPFD responds with fire suppression apparatus and crews from a single fire station that serves both the city and the township. As the first out staffing is a minimum of two or three depending on staffing levels, the MPFD relies heavily on paid-on-call staff and auto/mutual aid companies for fire and EMS service delivery, particularly to collect the appropriate Effective Response Force for single family, multi- family, vertically dense, commercial, and other building type fire responses.

Emergency response units include:

Engine Companies, which are primarily designed for firefighting operations, the transport of crew members, hose (fire attack and larger supply), tank water, ground ladders, self-contained breathing apparatus, and storage of an assortment of hand tools used for a broad spectrum of fire operational tasks. As engines are often utilized as first response units on EMS calls, they also carry an assortment of EMS gear to treat patients and provide life-saving measures prior to the arrival of EMS transport units. The MPFD engine is set up for this as well and is staffed with advanced emergency medical technicians. Staffing complements for engine apparatus are discussed below. MPFD currently responds to emergencies with an inventory of three engines rotating every three weeks.

Ladder Company, which are also primarily designed for firefighting operations but differ from engines in that they also have a hydraulically operated aerial device designed to reach above grade floors to transport crew members, effect rescues, and provide an elevated water stream. Ladder trucks also transport crew members, ground ladders, self-contained breathing apparatus, various forcible entry tools, ventilation equipment, and hydraulic rescue tools as well as other equipment to deal with an assortment of fires and technical rescues. Some ladder trucks, such as the one in the MPFD, carry hose (fire attack and larger supply) and tank water.

Rescue Company, which is also primarily designed for firefighting operations and transports crew members, self-contained breathing apparatus, various hand and forcible entry tools, ventilation equipment, hydraulic rescue tools as well as other specialty equipment such as rope and rope equipment, vehicle stabilization devices, various mechanical cutting and burning tools, and other specialty tools and equipment to deal with an assortment of fire and technical rescue incidents. The MPFD currently responds to emergencies with an inventory of one rescue truck.

Water Tender, which is a type of firefighting apparatus that specializes in the transport of water utilizing a large on-vehicle tank to a fire scene. The MPFD currently responds to emergencies with an inventory of one tender truck.

Brush Truck, is a combination of an all-terrain vehicle, mini-pumper used to fight wildfires. It is sometimes also known as a forestry or wildland truck. This type of vehicle is designed to assist in fighting brush and wildfires by transporting firefighters to the scene and providing them with off-road access to the fire, along with water or other brush/wild land firefighting equipment. The MPFD currently responds to emergencies with an inventory of one brush truck.

Command Vehicles, which are typically SUV-type vehicles with command centers built into the cargo compartment are designed to carry a command level officer to the scene, and equipped with radio and command boards, as well scene personnel tracking equipment and associated gear. MPFD has one command vehicle unassigned, sedan assigned to Fire Marshal, SUV assigned to the Fire Chief and a SUV assigned to the Assistant Chief (Vacant). These personnel are responsible for responding to fire and EMS incidents and establishing command and control of the incident.

Critical Tasking, NFPA 1720, Effective Response Force

Emergency events occur at all hours, on all days, and under all conditions. The fire and EMS service's response to these unpredictable conditions has been to develop a methodology for being prepared to respond and deploy adequate resources in a timely fashion when they occur.

The rapid and effective performance of highly coordinated assigned tasks is the hallmark of a successful emergency response force whether it be Fire or EMS or combined. Time and on-scene performance expectations are the target indicators established for measuring the operational elements (individuals, crews, and work units) that comprise response-ready resources.

Critical tasks are those activities that must be conducted on time and preferably simultaneously by responders at emergency incidents to control the situation and minimize/stop loss (property and life-safety).

Critical tasking for fire operations is the minimum number of personnel needed to perform the tasks needed to effectively control and mitigate a fire or other emergency.

Critical tasking for EMS operations is those activities (clinical and operational) that must be conducted, some in succession, and some simultaneously to rapidly assesses the patient, determine the level of intervention needed, if any, and connect the patient with the appropriate level of pre-hospital clinical care.

To be effective, critical tasking must assign enough personnel so that all identified functions can be performed as described above. However, it is important to note that initial response personnel may manage secondary support functions once they have completed their primary assignment. Thus, while an incident may end up requiring a greater commitment of resources or a specialized response, a properly executed critical tasking assignment will provide adequate resources to immediately begin bringing the incident under control.

The specific number of people required to perform all the critical tasks associated with an identified risk or incident type (Fire, EMS, and Fire/EMS) is referred to as an *Effective Response Force* (ERF). The goal is to deliver an ERF within a prescribed period of time as outlined in national standards and the ISO-PPC benchmarking.

Fire Critical Tasking

The MPFD as a career, paid-on-call agency aligns with NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments*, 2020 edition (National Fire Protection Association, Quincy, Mass.). This standard outlines organization and deployment of operations by volunteer and combination (a fire department having emergency service personnel comprising less than 85 percent majority of either volunteer or career membership) fire and rescue organizations. It serves as a benchmark to measure staffing and deployment of resources to certain fire incidents and emergencies. NFPA 1720 is a nationally recognized standard, but it has not been adopted as a mandatory regulation by the federal government or the State of Michigan. It is a valuable resource for establishing and measuring performance objectives for the MPFD but should not be the only determining factor when making local decisions about the city's fire services.

According to NFPA 1720, fire departments should base their specific role on a formal community risk management plan, as discussed earlier in this analysis, and taking into consideration:[23]

- Life hazard to the population protected. The number and type of units assigned to respond to a reported incident shall be determined by risk analysis and/or pre-fire planning.
- Fire suppression operations shall be organized to ensure that the fire department's fire suppression capability includes personnel, equipment, and other resources to deploy fire suppression resources in such a manner that the needs of the organization are met.
- The Authority Having Jurisdiction shall promulgate the fire department's organizational, operational, and deployment procedures by issuing written administrative regulations, standard operating procedures, and departmental orders.
- The number of members that are available to operate on an incident is sufficient and able to meet the needs of the department.
- Provisions for safe and effective firefighting performance conditions for the firefighters.
- Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment to respond.
- Initial firefighting operations shall be organized to ensure that at least four members are assembled before interior fire suppression operations are initiated in a hazardous area.
- The capability to sustain operations shall include the personnel, equipment, and resources to conduct incident specific operations.

Fire and rescue work are task-oriented and labor intensive, performed by personnel wearing heavy, bulky personal protective equipment (PPE). Many critical fireground tasks require the skillful operation and maneuvering of heavy equipment.

The speed, efficiency, and safety of fireground operations are dependent upon the number of firefighters performing the tasks. If fewer firefighters are available to complete critical fireground tasks, those tasks will require more time to complete. This increased time is associated with elevated risk to both firefighters and civilians.

To ensure civilian and firefighter safety, fireground tasks must be coordinated and performed in rapid sequence. Assembling an Effective Response Force (ERF) is essential to accomplish on-scene goals and objectives safely and efficiently. Without adequate resources to control a building fire, the building and its contents continue to burn. This increases the likelihood of a sudden change in fire conditions, and thus the potential for failure of structural components leading to collapse. An inadequate ERF limits firefighters' ability to successfully perform a search and potential rescue of any occupants.

As a fire grows and leaves the room and then floor of origin, or extends beyond the building of origin, it is most probable that additional personnel and equipment will be needed, as initial response personnel will be taxed beyond their available resources. From this perspective it is critical that the MPFD units respond quickly and initiate extinguishment efforts as rapidly as possible after notification of an incident. It is, however, difficult to determine in every case the effectiveness of the initial response in limiting the fire spread and fire damage. Many variables will impact these outcomes, including:

23. NFPA 1720

- The time of detection, notification, and response of fire units.
- The age and type of construction of the structure.
- The presence of any built-in protection (automatic fire sprinklers) or fire detection systems.
- The contents stored in the structure and its flammability.
- The presence of any flammable liquids, explosives, or compressed gas canisters.
- Weather conditions and the availability of water for extinguishment.

Subsequently, in those situations in which there are extended delays in the extinguishment effort, or the fire has progressed sufficiently upon arrival of fire units, there is actually very little that can be done to limit the extent of damage to the entire structure and its contents. In these situations, suppression efforts may need to focus on the protection of nearby or adjacent structures (exterior exposures) with the goal being to limit the spread of the fire beyond the building of origin, and sometimes the exposed building. This is often termed *protecting exposures*. When the scope of damage is extensive, and the building becomes unstable, firefighting tactics typically move to what is called a *defensive attack*, or one in which hose lines and more importantly personnel are on the outside of the structure and their focus is to merely discharge large volumes of water until the fire goes out. In these situations, the ability to enter the building is extremely limited and if victims are trapped in the structure, there are very few safe options for making entry.

Today's fire service is actively debating the options of interior firefighting vs. exterior firefighting. These terms are self-descriptive in that an *interior fire attack* is one in which firefighters enter a burning building in an attempt to find the seat of the fire and from this interior position extinguish the fire with limited amounts of water. An *exterior fire attack*, also sometimes referred to as a *transitional attack*, is a tactic in which firefighters initially discharge water from the exterior of the building, either through a window or door and knock down the fire before entry in the building is made. The concept is to introduce larger volumes of water initially from the outside of the building, cool the interior temperatures, and reduce the intensity of the fire before firefighters enter the building.

A transitional attack is most applicable in smaller structures, typically single-family, one-story detached units that are smaller than 2,500 square feet in total floor area. For fires in larger structures, the defensive-type, exterior attacks involve the use of master streams, typically from an elevated aerial device, and capable of delivering large volumes of water for an extended period of time.

The exterior attack limits the firefighter from making entry into those super-heated structures that may be susceptible to collapse. From CPSM's perspective, there is the probability, depending on the time of day, an MPFD response crew of a limited number of personnel on the initial response will encounter a significant and rapidly developing fire situation. *It is prudent, therefore, that the MPFD builds at least a component of its training and operating procedures around the tactical concept of this occurring.*

The variables of how and where personnel and companies are located, and how quickly they can arrive on scene, play major roles in controlling and mitigating emergencies. *The reality is that MPFD relies on mutual aid, career member callback, and paid-on-call response from home or work to make up the teams and crews of the Effective Response Force.* MPFD's paid-on-call availability at any time of the day may have an impact on assembling enough personnel and resources on the scene. This factor has to be considered at all times by those responding to the

scene, those responding to the station to pick up apparatus, and command officers responding who must manage and coordinate available responding and on-scene resources.

NFPA 1720 establishes the minimum response staffing for a predominately volunteer department for low-hazard structural firefighting incidents (to include out buildings and up to a 2,000 square-foot, one- to two-story, single-family dwelling without a basement and no exposures) for specific demand zones as shown in the following table.

Each demand zone takes into consideration certain risk elements such as population density, exposed occupied buildings (more predominant in urban and suburban demand zones), water supply, and proximity to responding apparatus and members (incident and fire station).

NFPA 1720 demand zone response criterion is described in the next table.

Table 31: NFPA 1720 Staffing for Effective Response Force, Residential Structure

Demand Zone	Demographics	Minimum Staff to Respond to Scene*	Response Time Standard to Collect Minimum Staff
Urban Area	>1000 people/mi^2	15	Within 9 minutes 90 percent of the time
Suburban Area	500-1000 people/mi^2	10	Within 10 minutes 80 percent of the time
Rural Area	<500 people/mi^2	6	Within 14 minutes 80 percent of the time
Remote Area	Travel Distance $\geq$ 8 miles	4	Directly dependent on travel distance, determined by AHJ, 90 percent of the time

Note: *Minimum staff responding includes automatic and mutual aid. Minimum staff responding to scene by apparatus and personal owned vehicle.

The next figure shows the areas of MPFD response area that are urban, suburban, and rural as benchmarked against the NFPA 1720 demographics. The purpose of this map is to identify where the NFPA 1720 demand zones exist in the city and how this links to the Effective Response Force for each zone the MPFD should strive to meet for building fires. The largest built-upon land area of the MPFD response area (City of Mt. Pleasant and Charter Township of Union) meets the NFPA 1720 suburban demand zone minimum staff to respond benchmark, that is, 10 personnel. There is a large area as well of urban demand zone, which has response benchmark of 15 personnel.

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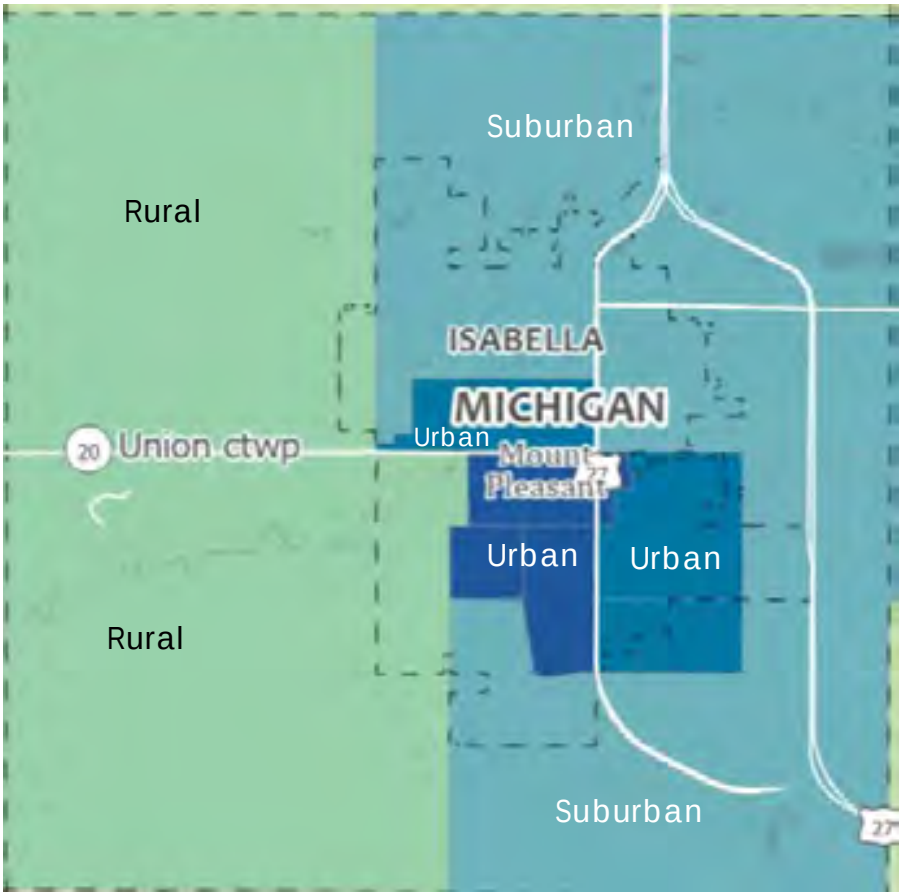
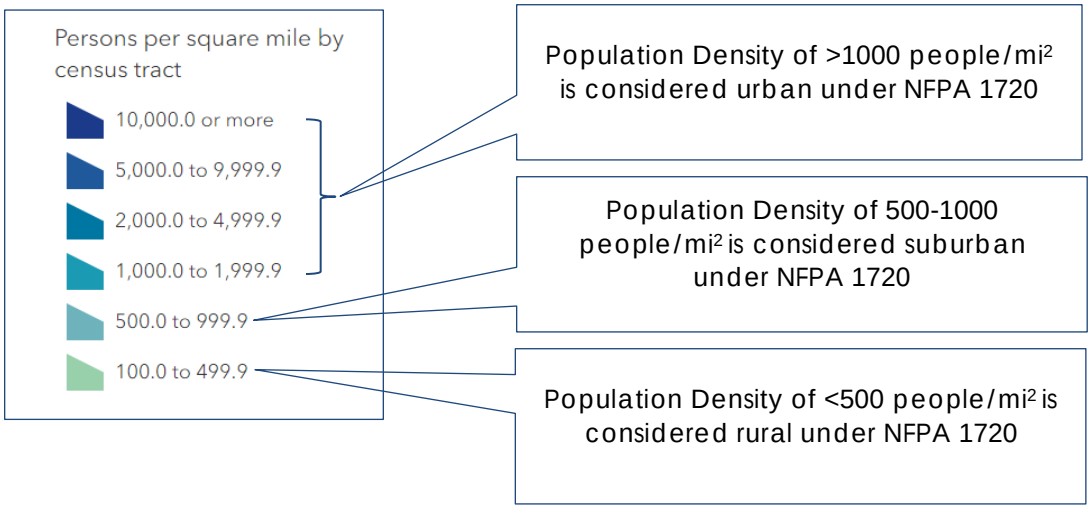
Figure 21: MPFD NFPA 1720 Demand Zones





The next three tables provide examples of operational critical tasking utilizing the NFPA 1720 minimum staffing criteria. As discussed above, the urban demand zone stipulates the largest minimum staffing. In the urban demand zone, when the minimum staffing assembles, critical tasks are completed simultaneously. *MPFD has urban demand zones in its response district as defined by NFPA 1720.*

In the suburban, rural, and remote demand zones, critical tasks are combined more frequently than in the urban demand zone, creating circumstances where these critical tasks are completed in sequence, rather than simultaneously. *MPFD has suburban demand zones in its response district as defined in NFPA 1720.*

The rural and remote demand zone minimum staffing can place one attack line in service, and then combine two-person crews (two for rural; one for remote) to handle one or two other critical tasks until additional crew members arrive on scene. Achieving completion of the basic fireground critical tasks as outlined in the suburban demand zone is less than optimal in the rural and remote demand zones. *The MPFD has rural demand zones in its response district as defined in NFPA 1720.*

Table 32: Critical Tasking in an Urban Demand Zone, Single-Family Dwelling

Critical	# of Responders Assigned to Task
Attack Line (2-In)	2
Backup/Second Line	2
Ventilation	2
Search and Rescue	2
Rapid Intervention (2-out)	2
Attack Engine Pump Operator	1
Water Source Engine Pump Operator	1
Outside Crew for: utility control, hose	
Incident Commander	1
Total Minimum Response for Urban Demand Zone	15

Table 33: Critical Tasking in a Suburban Demand Zone, Single-Family Dwelling

Critical	# of Responders Assigned to Task
Attack Line/Search and Rescue (2-In)	2
Backup/Second Line	2
Attack Engine Pump Operator	1
Water Source Engine Pump Operator	1
Outside crew for: rapid intervention crew	
Incident Commander	1
Total Minimum Response for	10

Table 34: Critical Tasking in a Rural Demand Zone, Single-Family Dwelling

Critical	# of Responders Assigned to Task
Attack Line/Search and Rescue (2-In)	2
Backup/Second Line	2
Outside crew for: initial engine pump operator	
Total Minimum Response for Rural Demand Zone	6

MPFD Staffing Model

Currently MPFD has three full time (24 hour) positions per shift. In previous years there were four full time (24 hour) positions according to the MPFD Fire Chief. When one of the shifts has a vacancy due to scheduled or unscheduled leave, or the position is vacant, there may be only two full time employees on duty.

On weekdays and during the daytime work hours, at least one of the FTE is away from the station in a light MPFD vehicle conducting rental property inspections. When staffing is at three for the shift, this leaves two in the station to staff and deploy apparatus for response. When staffing is at two for the shift, this leaves one in the station to staff and deploy apparatus for response.

The MPFD does have a standardized staffing model for apparatus, meaning an apparatus responds with a minimum of two qualified members. The MPFD has an SOP (1.8: Incident Response) directing POC members either to the scene or to the station (call dependent).

The following information was reviewed from SOP 1.8 Incident Response and describes, depending on staffing levels, how MPFD career response of apparatus.

Residential (1 and 2 Family Dwelling) Structure Fires

- If two full time shift personnel are on duty, respond with one engine.
- If three or more full time shift personnel are on duty, respond with two engines.
- Paid-on-Call Firefighters will be dispatched to the scene at the discretion of the Sergeant or duty officer.

Commercial and Multi-family Structure Fires

- If two full time shift personnel are on duty, respond with one engine.
- If three or more full time shift personnel are on duty, respond with one engine and the ladder.
- Paid-on-Call Firefighters may be dispatched to the scene at the discretion of the Sergeant or duty officer.

High-rise Fires

- If two full time shift personnel are on duty, respond with one engine.
- If three or more full time shift personnel are on duty, respond with an engine and the ladder.
- Paid-on-Call Firefighters may be dispatched to the scene at the discretion of the Sergeant or duty officer.

In the above scenarios, one career firefighter may be conducting rental inspections (Monday-Friday) and out of position to respond back to the station and staff the responding apparatus. In these cases, and when the daily staffing is two, the apparatus responds with one engine (driver only) or when the daily staffing is three, with one engine and one ladder (driver only). The firefighter out doing rental inspections responds to the scene.

OSHA "Two-In/Two-Out"

Another consideration, and one that links to critical tasking and assembling an Effective Response Force, is that of two-in/two-out regulations. Essentially, prior to starting any fire attack in

an immediately dangerous to life and health (IDLH) environment [with no confirmed rescue in progress], the initial two-person entry team shall ensure that there are sufficient resources on-scene to establish a two-person initial rapid intervention team (IRIT) located outside of the building.

This critical tasking model outlined above has its genesis with the Occupational Safety and Health Administration, specifically 29 CFR 1910.134(g)(4). This standard applies to the MPFD as Federal OSHA covers issues not covered in the state plan.

CFR 1910.134(g)(4): Procedures for interior structural firefighting. In addition to the requirements as set forth under paragraph (g)(3), interior structural fires, the employer shall ensure that:

- 1910.134(g)(4)(i)
  - At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;

- 1910.134(g)(4)(ii)
  - At least two employees are located outside the IDLH atmosphere; and

- 1910.134(g)(4)(iii)
  - All employees engaged in interior structural firefighting use SCBAs.

Note 1 to paragraph (g): One of the two individuals located outside the IDLH atmosphere may be assigned to an additional role, such as incident commander in charge of the emergency or safety officer, so long as this individual is able to perform assistance or rescue activities without jeopardizing the safety or health of any firefighter working at the incident.

Note 2 to paragraph (g): Nothing in this section is meant to preclude firefighters from performing emergency rescue activities before an entire team has assembled.

NFPA 1500, Standard on Fire Department Occupational Health, Safety, and Wellness, 2021 Edition, has similar language as CFR 1910.134(g)(4) to address the issue of two-in/two-out, stating the initial stages of the incident where only one crew is operating in the hazardous area of a working structural fire, a minimum of four individuals shall be required consisting of two members working as a crew in the hazardous area and two standby members present outside this hazard area available for assistance or rescue at emergency operations where entry into the danger area is required.

NFPA 1500 also speaks to the utilization of the two-out personnel in the context of the health and safety of the firefighters working at the incident. The assignment of any personnel including the incident commander, the safety officer, or operations of fire apparatus, shall not be permitted

as standby personnel if by abandoning their critical task(s) to assist, or if necessary, perform rescue, this clearly jeopardizes the safety and health of any firefighter working at the incident.[24]

As is common with many volunteer/combination fire departments, MPFD does not respond to structural fires with a pre-determined staffing regimen or a guaranteed command officer on the initial alarm dispatch. Under this response model, MPFD may or may not have the minimum number of firefighters on the initial response in order to comply with CFR 1910.134(g)(4), regarding two-in/two-out rules and initial rapid intervention team (IRIT). Responding members must be mindful of who and what apparatus is on scene and the Two-In/Two-Out concept.

In order to meet CFR 1910.134(g)(4), and NFPA 1500, the MPFD must utilize two personnel to commit to interior fire attack while two firefighters remain out of the hazardous area or immediately dangerous to life and health (IDLH) area to form the Initial Rapid Intervention Team (IRIT), while attack lines are charged, and a continuous water supply is established.

However, NFPA 1500 allows for fewer than four personnel under specific circumstances.[25]

> *The assembling of four members for the initial fire attack can be accomplished in many ways. In their response plan, the fire department should determine the manner in which they plan to assemble members. The four members assembled for initial fire-fighting operations can include an officer, chief officer, or any combination of members arriving at the incident. For career departments, the four members should arrive in tandem if on separate units.*
>
> *If members are going to initiate actions that would involve entering a structure because of an imminent life-threatening situation where immediate action can prevent the loss of life or serious injury and four members are not yet on the scene, the members should carefully evaluate the level of risk that they would be exposed to by taking such action. If it is determined that the situation warrants such action, incoming companies should be notified so that they will be prepared to provide necessary support and backup upon arrival.*

In the end, the ability to assemble adequate personnel, along with appropriate apparatus to the scene of a structure fire, is critical to operational success and firefighter safety. NFPA 1720 addresses this through the staffing matrix for the various demand zones.

Paid-On-Call Members Responding to the Scene

There are several factors a fire department that uses POC's to fill their initial staffing requirements must consider when implementing response policies. These considerations must ensure the effective use of resources and the safety of the public and firefighters, and are as follows:

- Accountability of responding and on-scene resources, and in the case of firefighters responding in personal vehicles, their ability to arrive safely and function safely prior to the initial arriving fire apparatus.
- Meeting the intent of NFPA 1720 standards, in particular ensuring personnel responding to fires and other emergencies are organized into company units or response teams consisting of a team of at least two.

24. NFPA 1500, 8.8.2.5, 2021 Edition
25. NFPA 1500, A..8.8.2, 2021 Edition

- The avoidance of freelancing on the fireground, particularly early arriving POC firefighters to an incident in personal vehicles.
- Organizing initial firefighting operations, ensuring that at least four members are assembled before interior fire suppression operations are initiated in a hazardous area.
- It is of the highest importance that firefighters are trained and disciplined not to freelance or enter a hazardous area or building on fire without the proper equipment beyond their issued personal protective clothing if they arrive to an emergency scene prior to responding fire apparatus.
- Ensuring assembled personnel have radio communication with Incident Command at all times so that they may transmit urgent messages, critical task progress, incident updates, and their team's location, accountability of their actions, and receive from Incident Command and/or other teams operating at the scene urgent messages, updates, critical task progress, other team locations, and receive new assignments.

NFPA 1720 calls attention to additional staffing/response requirements worth noting here:

- *The fire department shall identify minimum staffing requirements to ensure that the number of members that are available to operate are able to meet the needs of the department.*
  - For the volunteer component this can include scheduled staffing at a predetermined station or pre-determined staff responding to stations to assemble and respond on apparatus.
- *Where staffed stations are provided, when determined by the authority having jurisdiction, they shall have a turnout time of 90 seconds for fire and special operations and 60 seconds for EMS incidents, 90 percent of the time.*
  - This should be measured at a staffed station.
- *Upon assembling the necessary resources at the emergency scene, the fire department shall have the capability to safety commence an initial attack within 2 minutes 90 percent of the time.*
  - This should be announced by the incident commander over the radio and measured through the computer-aided dispatch (CAD) system after the arrival of the initial arriving members, companies, and response teams.
- *Personnel responding to fires and other emergencies shall be organized into company units or response teams and have the required apparatus and equipment.*
  - This avoids freelancing by personnel before and after the arrival of the fire suppression units; enables the incident commander to size-up available on-scene resources, ensures fireground accountability, and ensures a coordinated assignment of critical tasks.

The 2021 edition of NFPA 1500 standard on *Fire Department Occupational Safety, Health, and Wellness Program* is equally clear on the critical emergency scene function of personnel accountability. Additionally, the 2020 edition of NFPA 1561 *Emergency Services Incident Management System and Command Safety* more specifically addresses emergency scene accountability. Accountability systems include tracking systems where responding apparatus crews or individuals deliver accountability tags to Incident Command for use when command assigns members and companies, and forms crews and groups (interior, roof, hazard control etc.). The Incident Commander places the accountability tags on a board or other tracking

instrument that he/she can constantly visualize, move when crews are reassigned, and maintain accountability awareness.

These standards include language as outlined in the following table.

Table 35: Emergency Scene Accountability–NFPA 1500 and NFPA 1561

NFPA 1500	NFPA 1561
8.5.1: The fire department shall establish written standard operating procedures for a personnel accountability system; this is in accordance with NFPA 1561.	4.6.1: The ESO shall develop and routinely use a system to maintain accountability for all resources assigned to the incident with special emphasis on the accountability of personnel.
8.5.3: It shall be the responsibility of all members operating at the emergency incident to actively participate in the personnel accountability system.	4.6.2: The system shall maintain accountability for the location and status condition of each organizational element at the scene of the incident.
8.5.4: The incident commander shall maintain an awareness of the location and function of all companies or crews at the scene of the incident.	4.6.3: The system shall include a specific means to identify and keep track of responders entering and leaving hazardous areas, especially where special protective equipment is required.
8.5.8: Members shall be responsible for following personnel accountability system procedures.	4.6.5: Responder accountability shall be maintained and communicated within the incident management system when responders in any configuration are relocated at an incident.
8.5.9: The personnel accountability system shall be used at all incidents.	4.6.6: Supervisors shall maintain accountability of resources assigned within the supervisor's geographical or functional area of responsibility.
8.5.10: The fire department shall develop, implement, and utilize the system components required to make the personnel accountability system effective.	4.6.10: Responders who arrive at an incident in or on marked apparatus shall be identified by a system that provides an accurate accounting of the responders on each apparatus.
	4.6.11: Responders who arrive at the scene of an incident by other means other than emergency response vehicles shall be identified by a system that accounts for their presence and their assignment at the incident scene.
	4.6.14: The system shall also provide a process for the rapid accounting of all responders at the emergency scene.

Part 74, R 408.17451(b) (Management of Emergency Operations) of the Michigan OSHA Standards (MIOSHA) requires *that a personnel accountability system is implemented art each emergency.* The MPFD is compliant with this as policy (CPSM did not measure implementation) through MPFD Policy #115.

Overall, there were sixteen structure fire calls in the City of Mt. Pleasant and nineteen structure fire calls in the Charter Township of Union during the CPSM data study period (May 1, 2022, and April 30, 2023). The next table outlines these responses by number of fire units that responded and personnel count.

Table 36: Structure Fires by Number of Arriving Units and Personnel

Area	Incident ID	Date	Units	Personnel
Mt. Pleasant	0000381	2022-05-22	2	10
	0000415	2022-06-05	2	11
	0000419	2022-06-09	1	2
	0000475	2022-06-21	3	11
	0000501	2022-06-30	5	16
	0000521	2022-07-06	6	15
	0000632	2022-08-10	1	2
	0000651	2022-08-16	1	2
	0000753	2022-09-20	1	1
	0000770	2022-09-25	1	3
	0000804	2022-10-05	1	2
	0000853	2022-10-19	4	19
	0000902	2022-11-01	6	15
	0000061	2023-01-23	1	3
	0000112	2023-02-13	6	16
	0000124	2023-02-16	6	17
Charter Twp of Union	0000341	2022-05-10	3	17
	0000388	2022-05-24	2	12
	0000482	2022-06-23	1	2
	0000515	2022-07-04	2	3
	0000598	2022-07-28	1	2
	0000706	2022-09-02	1	2
	0000745	2022-09-16	4	8
	0000873	2022-10-23	1	2
	0000893	2022-10-29	1	2
	0000955	2022-11-21	1	2
	0000959	2022-11-22	1	3
	0000960	2022-11-22	3	11
	0000055	2023-01-20	7	15
	0000059	2023-01-22	1	3
	0000100	2023-02-09	5	11
	0000104	2023-02-13	2	4
	0000219	2023-04-02	7	15
	0000221	2023-04-03	4	13
	0000246	2023-04-16	2	11

This table depicts the area of response (city or township) and the number MPFD personnel who responded.

In the city, there were 16 structure fire calls. The MPFD was able to assemble 10 or more personnel 9 times or 56% of the time.

The largest NFPA 1720 Demand Zone is suburban, requiring a minimum of 10 responders.

In the township, there were 19 structure fire calls. The MPFD was able to assemble 10 or more personnel 8 times or 42% of the time.

The largest NFPA 1720 Demand Zone is suburban, requiring a minimum of 10 responders.

EMS Critical Tasking

Critical tasks by specific call type in EMS-only agencies assisted by fire departments are not as well-defined as those in the fire discipline. Notwithstanding, *Critical Tasking* in EMS is typical of that in the fire service in that there are certain critical tasks that need to be completed either in succession or simultaneously. EMS on-scene service delivery is based primarily on a focused scene assessment, patient assessment, and then followed by the appropriate basic and advanced clinical care through established medical protocols. EMS critical tasking is typically developed (in fire-based EMS Standards of Cover documents) in accord with the U.S. Department of Health and Human Services, Centers for Medicare & Medicaid Services (CMS), as:

- Basic Life Support (BLS), which is an emergency response by a ground transport unit (and crew) and the provision of medically necessary supplies and services.
- Advanced Life Support, Level 1 (ALS1), which is the transportation by ground ambulance vehicle and the provision of medically necessary supplies and services including the provision of an ALS assessment or at least one ALS intervention.
- Advanced Life Support, Level 2 (ALS2), which is the transportation by ground ambulance vehicle and the provision of medically necessary supplies and services including:
  - At least three separate administrations of one or more medications by intravenous push/bolus or by continuous infusion (excluding crystalloid fluids) or
  - (2) ground ambulance transport, medically necessary supplies and services, and the provision of at least one of the ALS2 procedures listed below:

    a. Manual defibrillation/cardioversion.

    b. Endotracheal intubation.

    c. Central venous line.

    d. Cardiac pacing.

    e. Chest decompression.

    f. Surgical airway.

    g. Intraosseous line.

The next set of tables reviews the critical tasking for the MPFD/MMR continuum of care. As indicated above, the critical tasking is based on the current CMS ground transport definition of ambulance services.

Table 37: BLS Critical Tasking

Critical Task	# Responders
Primary Patient Care Incident Command	1
Secondary Patient Care Vehicle Operations	1
Effective Response Force	2

Resource Deployment

1 Transport Ambulance

Table 38: ALS1 Critical Tasking

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care Vehicle Operations	2 1
Effective Response Force	5

Resource Deployment

1 Transport Ambulance
1 MPFD Fire Unit

Table 39: ALS2 Critical Tasking

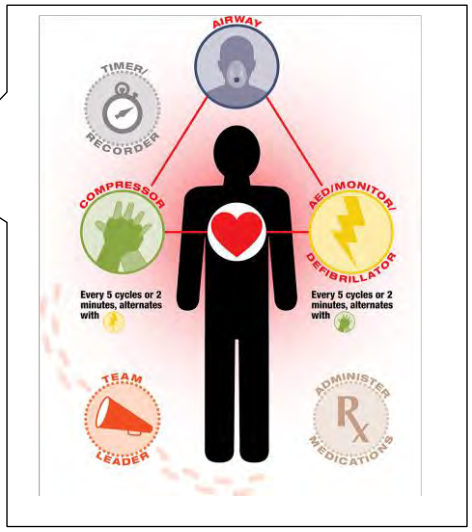
Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Tertiary Patient Care Provider	2
Vehicle Operations	1
Effective Response Force	6

Resource Deployment

1 Transport Ambulance
1 Command Officer
1 MPFD Fire Unit

Table 40: Pulseless/Non-Breathing Critical Tasking

Critical Task	# Responders
Incident Command	1
Primary Patient Care	1
Secondary Patient Care	1
Tertiary Patient Care Provider	2
Vehicle Operations	1
Effective Response Force	6



Resource Deployment

1 Transport Ambulance
1 Command Officer
1 MPFD Fire Unit

CPSM's assessment finds the MPFD has sufficient capabilities to respond to EMS calls in its current non-transport capacity.

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Public Safety Model

Some communities with limited resources often look at various models to staff and deploy municipal services as efficiently as possible. Some do this through interlocal agreements or through the creation of public service authorities. Public utilities, parks and leisure services, and public transportation are a few examples. Public safety certainly is an area that communities look to as well when considering how best to deploy resources, because law enforcement, EMS, and fire services are generally staffed twenty-four hours a day.

Mt. Pleasant does deliver public safety services through a "systems" model. Regarding municipal agencies, both the MPPD and the MPFD are first-response agencies to emergencies that occur in the city. This system also includes MMR, which provides EMS ground transport in Mt. Pleasant. Currently, the MPFD responds to many fire and EMS incidents. MPPD officers are already dynamically deployed in the city, so they may arrive first, if dispatched to, fire and EMS incidents. When MPPD officers arrive first, they are able to provide the initial size-up for MPFD and MMR responding units. *Overall, each agency looks to the other as a system partner in providing emergency response services to the community as effectively and efficiently as possible.*

An alternative to the traditional deployment of resources is the public safety director and public safety officer form of service delivery. In this form of service delivery, some—and in some instances, all members of both the police and fire agencies are cross-trained to deliver both categories of public safety services in an efficient and effective manner.

Mt. Pleasant already operates under the public safety administration model, with the Police Chief serving as the Public Safety Director. In this model the Fire Chief reports to the Public Safety Director. In the more formal public safety administrative model, one person is designated as the administrator of law enforcement services, and one is designated for fire services. Each is responsible for ensuring that all areas related to their public safety discipline are properly managed. The next figure illustrates an organizational chart for a public safety administration model.

Figure 22: Public Safety Administration Model: Organizational Chart

An efficiency gained in the public safety administration model is the sharing of administrative services and resources. Additionally, under this model, CPSM does not recommend the Fire Assistant Chief position be filled, but rather the focus should be on sustaining boots-on-the ground positions so that two MPFD personnel (full time or a combination of full time, paid on call, and part time) can be maintained in the station so there are no single firefighter responses on the fire apparatus to incidents.

As mentioned, an alternative to the traditional deployment of police and fire resources is the Public Safety Officer (PSO) form of public safety service delivery. The success of a fully consolidated agency depends on having individuals work together as a team regardless of their specific training and the specific primary discipline they are assigned (police or fire).

Although the cross-training of command staff is less critical than those assigned to field operations, it will make the model more successful. The cross-training of individuals responsible for incident command duties, however, is essential. Additionally, the more exposure the command staff has to all aspects of the public safety mission, the better the decision-making will be both administratively and operationally

In a fully staffed PSO service delivery model, the agency would be comprised totally of public safety officers. This of course may take considerable time to complete the training. Additionally, the city may have employees who are unwilling to undertake the cross-training, and this should be considered prior to implementation. Further, in a fully integrated public safety department, the public safety director should hold the title of police and fire chief to give clarity that this individual is responsible for all public safety activities.

As an alternative, the city may choose to implement a hybrid PSO program that may include:

- Training police officers in Medical First Response only and equipping patrol vehicles with EMS first response gear to include Automatic External Defibrillators (AEDs). Then MPPD patrol units can respond to EMS calls as the first tier either with or in lieu of MPFD units. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
- Training police officers in the firefighting discipline only and equipping each with firefighter personal protective clothing and associated gear. Then MPPD patrol units can respond to fire calls and be included in the assembling of an Effective Response Force. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
- Training police officers in both the firefighting discipline and to the Medical Fire Responder level with issued gear and equipment as described above, and dispatch police units to either all EMS and fire calls or as necessary when there are concurrent MPFD calls in the city (when a MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two, and POC staff are not available when a fire call is dispatched.
- Training firefighter staff in law enforcement and equipping each with required and necessary law enforcement equipment. Cross trained personnel can be used as additional backfill capacity to cover scheduled and unscheduled personnel (on their off days), and as surge capacity during special and large mass gathering events (primarily on their off days and potentially during on-shift times when POC staff is available and can be scheduled). This model may support dispatching on-duty firefighters (PSOs) to law enforcement calls as well, and in the proper response vehicle (not fire apparatus) when MPPD has concurrent calls.

The greater efficiencies in the PSO model are realized when police officers are training and equipped to respond to fire and EMS incidents while they are working in their assigned patrol districts.

Staffing Alternatives and Recommendations

There are several methods a combination fire department can consider and implement to ensure safe and effective response, while maintaining an efficient budget and effective service to the end user of the fire department response system. *Overall, what needs to be achieved for a safe and effective fire unit response - is a daily fire staffing of two MPFD personnel (full time or a combination of full time, paid on call, and part time) in the station, so there are no single firefighter responses on the fire apparatus, and for a safe and effective operational response to building fires - fulfilling the minimum response of personnel as outlined in NFPA 1720 in urban (15 firefighters), suburban (10 firefighters), and rural areas (6 firefighters) of the MPFD response district.* For the MPFD, this may include:

- Regarding paid-on-call personnel, the MPFD should consider:
  - Utilize the existing paid-on-call budget and establish a paid-on-premises program where paid-on-call personnel can sign-up for 4, 8, or 12 hour blocks and receive a stipend that correlates to the paid-on-premises block of time. Ideally these assignments will cover career vacancies created by scheduled or unscheduled leave first. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
  - Utilize the existing paid-on-call budget and establish a paid-on-premises program where paid-on-call personnel are assigned 12 hour blocks (nights and weekends) and receive a stipend that correlates to the paid-on-premises block of time. Ideally these assignments will cover career vacancies created by scheduled or unscheduled leave first. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
  - The MPFD should continue to develop aggressive recruitment strategies for paid-on-call personnel. This may include working with and obtaining resources from the National Volunteer Fire Council and applying for a federal grant through FEMA's Assistance to Firefighters Grants program for paid-on-call/volunteer firefighter recruitment and retention funds.
- Utilize the existing paid-on-call budget and establish six part-time firefighter positions. Under this program, part-time personnel would be required to work a minimum number of hours each month to cover career vacancies created by scheduled or unscheduled leave to maintain the minimum daily staffing of three. The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.
- As the rental housing inspection program is demanding on the time of career shift staff, and as there are times during the workweek (Monday-Friday) and workday (8:00 am-6:00 pm) where only one career staff remains in the station for response to calls for service, the city and the MPFD should consider hiring a rental inspector to perform the inspection duties of the rental inspection program. This potentially may be a part-time position 24-32/hours/week. Potentially there may be room in the paid-on-call personnel budget to shift monies to fund this position. CPSM further recommends this position be trained in firefighting and medical first response and be available during the workday to respond to designated emergency responses such as structural fires or other multi-unit responses as designated by the Fire Chief.

The goal is to maintain a minimum of two in the station so there are no single firefighter responses on the fire apparatus.

- As MPFD calls for service are higher between the hours of 9:00 am and 8:00 pm, and peak at the 1:00 pm, 3:00 pm, 5:00 pm and 6:00 pm hours, the city, the township, and the MPFD should consider offering street department, utilities, recreation, code enforcement, engineering, and the like, who are out and about in the city and township during the normal workday and are assigned a city or township vehicle, an opportunity to receive firefighter and medical first responder training (or training as designated by the Fire Chief) and then respond to designated emergency incidents, during the workday, and assist the MPFD mitigate city/township emergencies. The goal is to bolster the Effective Response Force on structure fires and designated MPFD multi-unit responses.
- CPSM recommends the MPFD, to the extent possible and if practical depending on available automatic and mutual aid resources, work with regional Fire Chiefs to increase response resources system-wide to fire responses that align more closely with the NFPA 1720 Effective Response Force standards.
- CPSM recommends the City more formally implement the Public Safety Administration model that clearly defines the Public Safety Director and the Police and Fire Administrators, and which is identified in a organizational chart. CPSM further recommends the City consider adopting a Public Safety Officer model either in full or in a hybrid model that considers the greater efficiencies of a Public Safety Officer model is realized when police officers are trained and equipped to respond to fire and EMS incidents while they are working in their assigned patrol districts, and includes:
  - Training police officers in Medical First Response only and equipping patrol vehicles with EMS first response gear to include Automatic External Defibrillators (AEDs). Then MPPD patrol units can respond to EMS calls as the first tier either with or in lieu of MPFD units. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
  - Training police officers in the firefighting discipline only and equipping each with firefighter personal protective clothing and associated gear. Then MPPD patrol units can respond to fire calls and be included in the assembling of an Effective Response Force. This model will be most useful when there are concurrent MPFD calls in the city (when an MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two and POC staff are not available.
  - Training police officers in both the firefighting discipline and to the Medical Fire Responder level with issued gear and equipment as described above, and dispatch police units to either all EMS and fire calls or as necessary when there are concurrent MPFD calls in the city (when a MPFD unit is tied up on another incident-fire or EMS) and/or when staffing levels in MPFD are at two, and POC staff are not available when a fire call is dispatched.
  - Training firefighter staff in law enforcement and equipping each with required and necessary law enforcement equipment. Cross trained personnel can be used as additional backfill capacity to cover scheduled and unscheduled personnel (on their off days), and as surge capacity during special and large mass gathering events (primarily on their off days and potentially during on-shift times when POC staff is available and can be scheduled). This model may support dispatching on-duty firefighters (PSOs) to law enforcement calls as well, and in the proper response vehicle (not fire apparatus) when MPPD has concurrent calls.

Factors on which these alternatives/recommendations are based on include:

- Demand for all services on the MPFD (fire and EMS response; community risk reduction; rental housing inspections).
- Community risks identified in this report.
- The MPFD has only one staffed fire suppression apparatus, and mutual and automatic aid response resources have extended response times due to the location of these assets.
- Resiliency.

  Overall, the MPFD does not have resiliency issues on the surface. Concurrent calls are infrequent, the average time on a call for the primary response engine units is below 30 minutes, the highest frequency of calls in an hour is zero, and total calls in a day is just below three, or one call every eight hours. Addtionally, and based on the response protocols as outlined in Standard Operating Procedure 1.8, there is not a resistance issue either.

  However, the MPFD's ability to absorb multiple calls and restore response capabilities to a state of normal can be challenging at certain times such as during working structural fires and other multi-company responses (runs). Additionally, and below the surface, the ability of the MPFD to respond to multiple calls when they do occur, and to respond additional apparatus on multi-unit and working fire and rescue calls is dependent on career staffing (minimum above two when available) and the availability of the POC response force.

- In addition to the above there are additional staffing alternatives the city and MPFD may consider include:
  - 12 hour shifts, which includes a four group system where a single group works a 12 hour shift day shift and is relieved by another group that works a 12 hour night shift. For example, a firefighter might work from 7:00 AM to 7:00 PM (day shift) or from 7:00 PM to 7:00 AM (night shift), depending on the group assignment. The 12 hour shift schedule is a rotating schedule the same as a 24 hour shift and requires four groups to cover all shifts continuously 365 days/year. To maintain a minimum of two full time career staff on duty per group, this would take eight full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. To maintain a minimum of three full time career staff on duty per group, this would take 12 full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. This schedule is designed to keep full time firefighters below the 53 hour Fair Labor Standards Act (FLSA) workweek standard.
  - 10-14 hour shifts, which also includes a four group system where a single group works a 10 hour shift day shift and is relieved by another group that works a 14 hour night shift. For example, a firefighter might work from 7:00 AM to 5:00 PM (day shift) or from 5:00 PM to 7:00 AM (night shift), depending on the group assignment. The 10-14 hour shift schedule is a rotating schedule the same as a 24 hour shift and requires four groups to cover all shifts continuously 365 days/year. To maintain a minimum of two full time career staff on duty per group, this would take eight full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. To maintain a minimum of three full time career staff on duty per group, this would take 12 full time positions and/or a combination of fulltime and schedule paid on call or part time personnel. This schedule generally designed to keep full time firefighters below the 53 hour Fair Labor Standards Act (FLSA) workweek standard but may not on certain weeks for groups working the 14 hour night shift, or a combination of 10 hour days and 14 hour night shifts and is dependent on the workweek pay period start and end and total hours regularly scheduled.

MPFD Response Times

Response times are typically a primary measurement for evaluating fire and EMS services. Response times can be used as a benchmark to determine how well a fire department is currently performing, to help identify response trends, and to predict future operational needs. Achieving the quickest and safest response times possible should be a fundamental goal of every fire department.

Travel time is a key point to understanding how fire and EMS station location influences a community's aggregate response time performance. Travel time can be mapped when existing and proposed station locations are known. The location of responding units is one key factor in response time; reducing response times, which is typically a key performance measure in determining the efficiency of department operations, often depends on this factor.

However, the actual impact of a speedy response time is limited to very few incidents. For example, in a full cardiac arrest, analysis shows that successful outcomes are rarely achieved if basic life support (CPR) is not initiated within four to six minutes of the onset. However, cardiac arrests occur infrequently; on average, these incidents make up a lower percent of all EMS incidents.[26] There are also other EMS incidents that are truly life-threatening, and the time of response can clearly impact the outcome. These involve cardiac and respiratory emergencies, full drownings, obstetrical emergencies, allergic reactions, electrocutions, and severe trauma (often caused by gunshot wounds, stabbings, and severe motor vehicle accidents, etc.). Again, the frequency of these types of calls is lower on average when looking at the totality of EMS responses.

As a low percentage of 911 patients have time-sensitive and advanced life support (ALS) needs, for those patients that do, time can be a critical issue of morbidity and mortality. For the remainder of those calling 911 for a medical emergency, though they may not have a medical necessity, they still expect rapid customer service. Response times for patients and their families are often the most important measurement of the EMS department. Regardless of the service delivery model, appropriate response times are more than a clinical issue; they are also a customer service issue and should not be ignored.

The next figure illustrates the chance of survival from the onset of cardiac arrest, largely due to ventricular fibrillation in terms of minutes without emergency defibrillation delivered by the public or emergency responders. The chance of survival has not changed over time since this graphic was first published by the American Heart Association in 2000.

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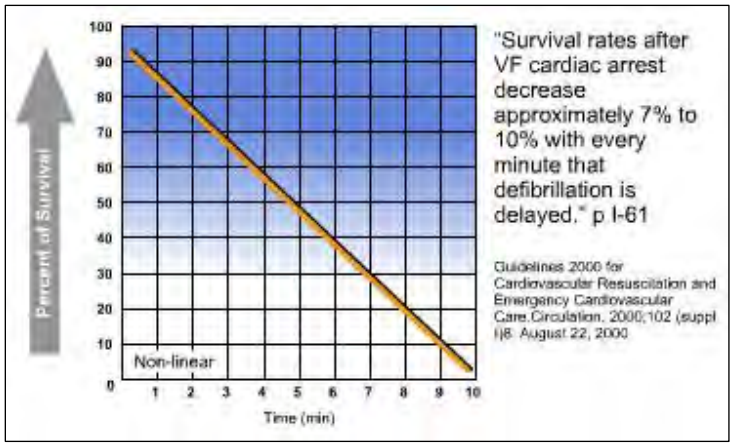
26 Myers, Slovis, Eckstein, Goodloe et al. (2007)." Evidence-based Performance Measures for Emergency Medical Services System: A Model for Expanded EMS Benchmarking." *Pre-hospital Emergency Care*.

Figure 23: Cardiac Arrest Survival Probability by Minute



Response times for fire incidents are based on the concept of "flashover." A flashover is the near-simultaneous ignition of most of the directly exposed combustible material in an enclosed area. When certain organic materials are heated, they undergo thermal decomposition and release of flammable gases. Flashover occurs when the majority of the exposed surfaces in a space are heated to their auto ignition temperature and emit flammable gases. "Flashover is the transition phase in the development of a contained fire in which surfaces exposed to thermal radiation, from fire gases in excess of 600 degrees Celsius, reach ignition temperature more or less simultaneously and fire spreads rapidly throughput the space."[27]

When the fire does reach this extremely hazardous state, initial firefighting forces are often overwhelmed, a larger and more destructive fire occurs, the fire escapes the room and even the building of origin, and significantly more resources are required to affect fire control and extinguishment.

To illustrate how a fire grows over a brief period of time, the next figure shows the time progression of a fire from inception (event initiation) through flashover. The time-versus-products of combustion curve shows activation times and effectiveness of residential sprinklers (approximately one minute), commercial sprinklers (four minutes), flashover (eight to ten minutes), and firefighters applying first water to the fire after notification, dispatch, response, and set-up (ten minutes).

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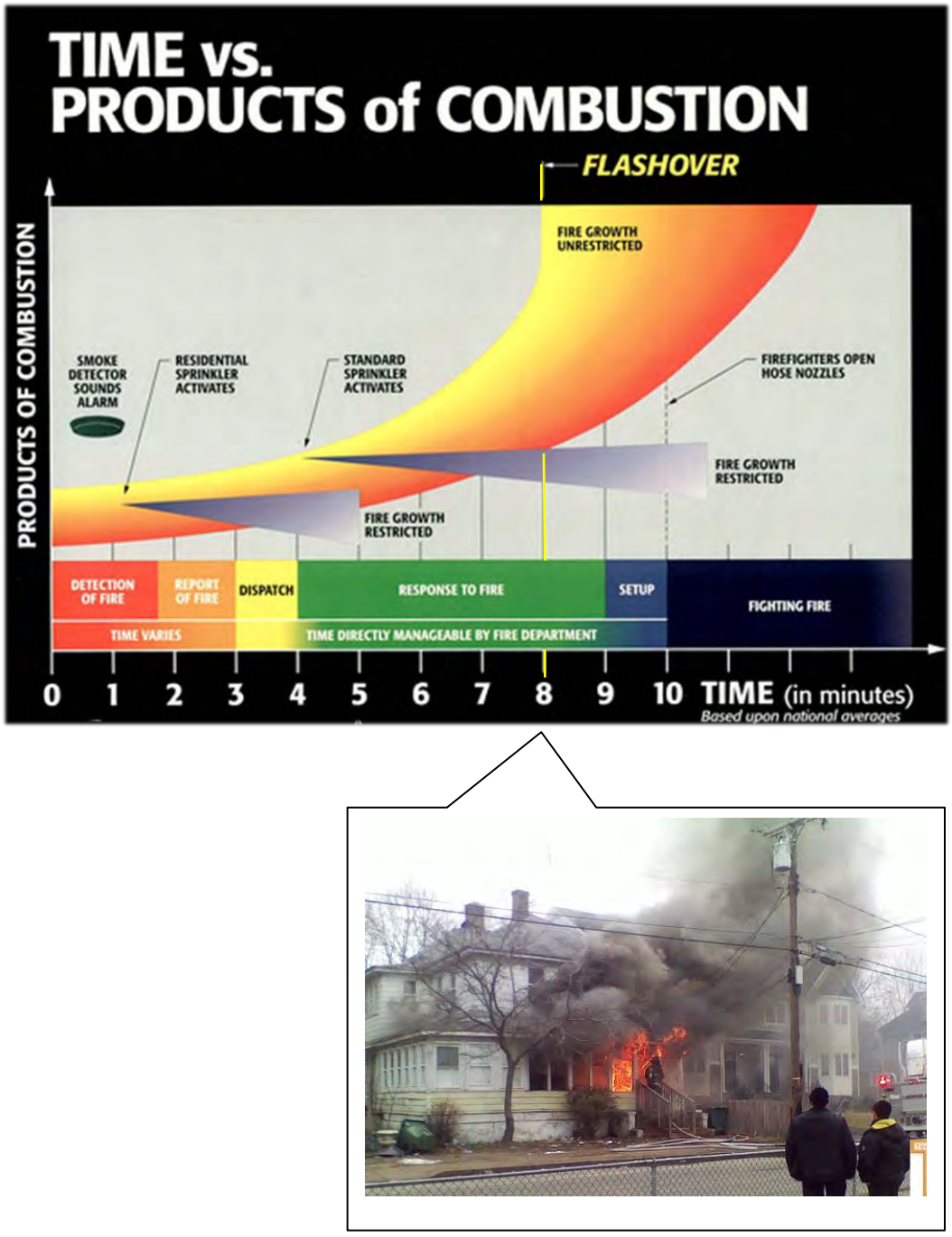
27. National Institute of Standards and Technology, Definition of Flashover.

Figure 24: Fire Growth[28]



The next figure illustrates the overview of response time performance for fire response under NFPA 1720.

A crucial factor in the whole response time question is what we term "detection time." This is the time it takes to detect a fire or a medical situation and notify 911 to initiate the response. In

28. Fire Protection System Designs, Grant, 2018

many instances, particularly at night or when automatic detection systems (fire sprinklers and smoke detectors) are not present or inoperable, the fire detection process can be extended.

The same holds true for EMS incidents. Many medical emergencies are often thought to be something minor by the patient, treated with home remedies, and the true emergency goes undetected until signs and symptoms are more severe. When the fire-EMS department responds, they often find these patients in acute states. Fires that go undetected and are allowed to expand in size become more destructive, are difficult to extinguish, and require more resources for longer periods of time.

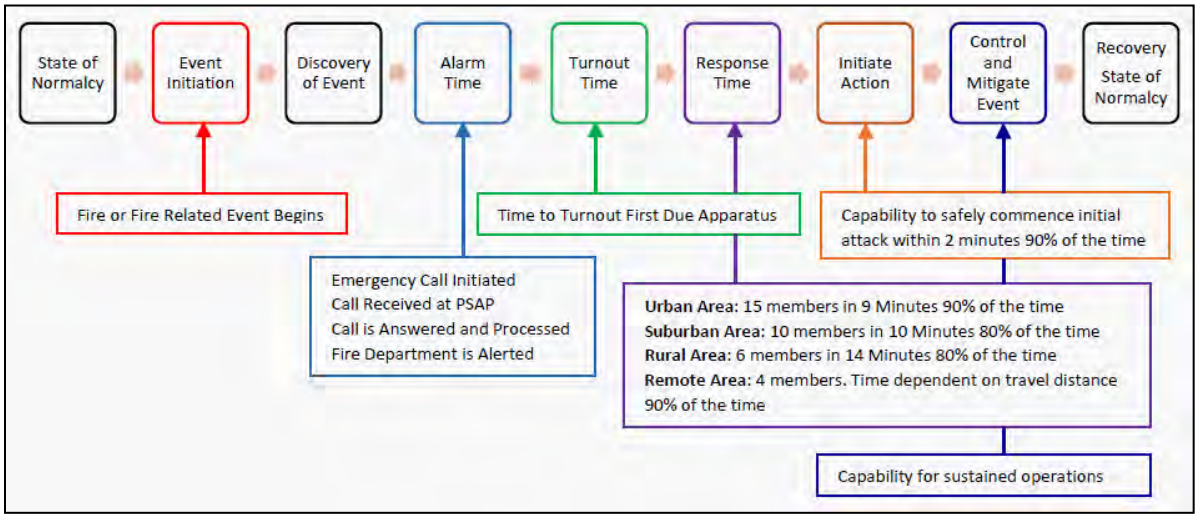
Response time is the total time elapsed between receiving a call to arriving on scene. In the data analysis, we included all calls within the primary service areas of MPFD to which at least one unit responded.

Dispatch time is the difference between the time a call is received and the earliest time an agency is dispatched. Dispatch time includes call processing time, which is the time required to determine the nature of the emergency and the types of resources to dispatch. The NFPA 1221 standard for this component of response times is the most utilized benchmark. Benchmark times include:

The next component of response time is turnout time, an aspect of response which is controlled by the responding Fire and/or EMS agency. Turnout time is the difference between the earliest dispatch time and the earliest time an agency's unit is en route to a call's location.

The last component of response time is travel time, an aspect of response time that is affected by factors such as station location, road conditions, weather, and traffic control systems. Travel time is the difference between the earliest en route time and the earliest arrival time.

Figure 25: NFPA 1720 Response Time Performance Measures



As a review, the next table shows the response time of and minimum staffing level for low-hazard structural firefighting incidents (to include out-buildings and up to a 2,000 square-foot, one- to two-story, single-family dwelling without a basement and no exposures) in each demand zone as defined by NFPA 1720. This table reflects the minimum staffing and response time in minutes to assemble the minimum staffing in each demand zone type (urban, suburban, rural, and

remote). The minimum staffing represents the response force necessary to combat or begin to combat a structural type of fire as described above.

Urban and suburban demand zones differ as these demand zones have a higher population density, and have a higher percentage of multifamily, townhouse, condominium, and multistory apartment building structures, which require a greater response force to complete the critical tasking necessary to mitigate the fire and life-safety emergency.

Table 41: NFPA 1720 Staffing and Response Times, Low-Hazard Structural Fire

Demand Zone	Demographics	Minimum Staff to Respond	Response Time in Minutes-Assembling Staff	Meets Objective Percentile
Urban Area	>1000 people/mi	15	9	90%
Suburban Area	500-1000 people/mi	10	10	80%
Rural Area	<500 people/mi	6	14	80%
Remote Area	Travel Distance ≥ 8 miles	4	Directly dependent on travel distance	90%

Response times for the MPFD are discussed next. In this analysis, we included all calls to which at least one non-administrative unit arrived. In addition, calls with a total response time exceeding 30 minutes were excluded. Finally, we focused on units that had complete time stamps, that is, units with all components recorded, so that we could calculate each segment of response time. Nonemergency calls including community paramedic, good intent, and public service calls were not included in this analysis.

Based on the methodology above, for 1,006 calls received for the study period, 223 calls were excluded. As a result, in this section, a total of 783 calls are included in the analysis.

The next tables break down the average, 80th, and 90th percentile total response times (in minutes). An 80th or 90th percentile means that 80 or 90 percent of calls had response times at or below that number.

Table 42: Average Response Time of First Arriving Unit, by Call Type (Minutes)

Call Type	Dispatch	Turnout	Travel	Total	Call Count
Medical and other	0.4	2.1	4.5	7.0	273
MVA	1.0	1.7	4.0	6.7	91
EMS subtotal	0.6	2.0	4.4	7.0	364
False alarm	1.4	2.3	5.4	9.0	203
Hazard	1.6	2.5	5.2	9.3	145
Outside fire	1.3	2.6	4.6	8.5	27
Structure fire	1.0	2.5	3.9	7.3	35
Technical rescue	0.6	3.4	3.7	7.7	9
Fire subtotal	1.4	2.4	5.1	8.9	419
Total	1.0	2.2	4.8	8.0	783

Table 43: 80th Percentile Response Times of First Arriving Unit, by Call Type

Call Type	80th Percentile Response Time				Call Count
	Dispatch	Turnout	Travel	Total	
Medical and other	0.6	3.6	6.1	8.9	273
MVA	1.5	2.7	5.2	7.9	91
EMS subtotal	0.9	3.4	6.0	8.9	364
False alarm	1.7	3.6	7.4	10.9	203
Hazard	2.1	4.3	7.2	11.2	145
Outside fire	1.7	4.0	5.7	9.2	27
Structure fire	1.4	3.4	6.3	8.8	35
Technical rescue	1.5	5.7	7.1	10.4	9
Fire subtotal	1.8	4.0	7.2	11.0	419
Total	1.5	3.7	6.8	10.2	783

Table 44: 90th Percentile Response Times of First Arriving Unit, by Call Type

Call Type	90th Percentile Response Time				Call Count
	Dispatch	Turnout	Travel	Total	
Medical and other	0.9	4.7	7.9	10.2	273
MVA	2.0	3.9	6.5	10.9	91
EMS subtotal	1.3	4.5	7.9	10.3	364
False alarm	2.2	4.9	8.6	12.3	203
Hazard	2.7	5.8	8.6	13.9	145
Outside fire	2.0	8.0	7.3	12.8	27
Structure fire	2.0	5.8	6.7	10.4	35
Technical rescue	1.9	12.0	8.3	12.8	9
Fire subtotal	2.3	5.3	8.3	12.7	419
Total	2.0	5.0	8.1	11.7	783

The next set of tables depicts the response times (in minutes) to each service area the MPFD responds into (city and township). As above, we will detail the average, 80th, and 90th percentile response times to calls that occurred in these response service areas.

Table 45: Average Response Time of First Arriving Unit, by Response Area

Area	Dispatch	Turnout	Travel	Total	Call Count
Mt. Pleasant	1.0	2.2	3.9	7.1	466
Charter Twp of Union	1.1	2.2	6.1	9.3	317
Total	1.0	2.2	4.8	8.0	783

Table 46: 80th Percentile Response Times of First Arriving Unit, by response Area

Area	80th Percentile Response Time				Call Count
	Dispatch	Turnout	Travel	Total	
Mt. Pleasant	1.6	3.9	5.3	8.9	466
Charter Twp of Union	1.5	3.3	8.0	11.1	317
Total	1.5	3.7	6.8	10.2	783

Table 47: 80th Percentile Response Times of First Arriving Unit, by response Area

Area	90th Percentile Response Time				Call Count
	Dispatch	Turnout	Travel	Total	
Mt. Pleasant	2.0	5.3	6.4	10.6	466
Charter Twp of Union	2.0	4.7	9.2	12.6	317
Total	2.0	5.0	8.1	11.7	783

It is important to understand that measuring and analyzing response times and response time coverage are measurements of performance. When we discussed community risk, we identified that the MPFD, like most other fire departments in the nation, is an all-hazards response agency. While different regions of the country respond to different environmental risks, the majority of hazards that fire departments confront remain the same. Linking response data to community risks lays the foundation for future fire department planning in terms of fire station location, the need for additional fire stations, and staffing levels whether supplied by the fire department or a combination of a jurisdiction's resources plus mutual/automatic aid.

Managing fire department response capabilities to the identified community's risk focuses on three components, which are:

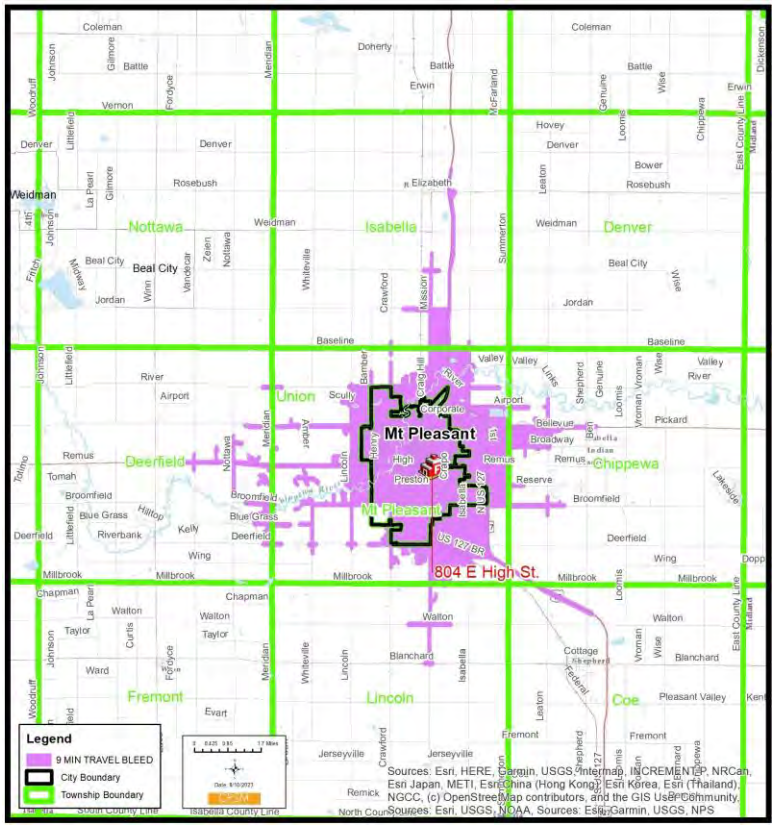
- Having a full understanding of the total risk in the community and how each risk impacts the fire department in terms of resiliency, what the consequences are to the community and fire department should a specific risk or combination of two or more occur, and preparing for and understanding the probability that the risk may occur.
- Linking risk to the deployment of resources to effectively manage every incident. This includes assembling an Effective Response Force for the response risk in measurable times benchmarked against NFPA standards, deploying the appropriate apparatus (engines, ladders, heavy rescues, ambulances), and having a trained response force trained to combat a specific risk.
- Understanding that each element of response times plays a role in the management of community risk. Lower response times of the initial arriving engine and low time to assemble an Effective Response Force on fire and other incidents are associated with positive outcomes.

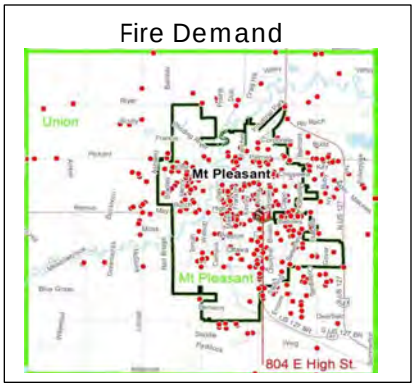
Additionally, and when measuring the collection of an Effective Response Force response time element under NFPA 1720, to effectively benchmark 10 firefighters in 10 minutes for a suburban demand zone response, or 15 firefighters in 9 minutes for an urban demand zone response, the incident commander must announce to the dispatcher when the response force by head count is collected (utilizing the required personnel accountability board for instance is one way to count firefighters on scene). By doing so, this announcement is recorded in the CAD times and can be evaluated periodically.

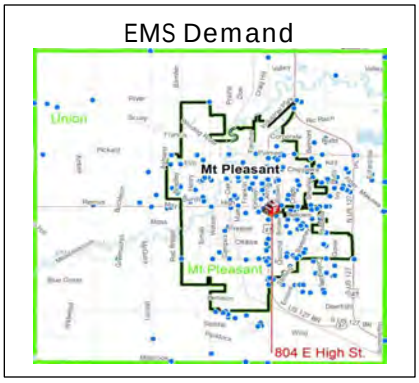
CPSM also looked at response travel times from a GIS perspective. The next two figures illustrate travel time bleeds from the MPFD facility utilizing the city and township road network, speed limits, traffic signal lights, stop signs, u-turs etc.

The first map shows 9-minute response travel time bleed, and the second map a 12-minute travel time bleed. Travel times are important, but can be affected by weather, road construction, and time of day (traffic patterns). Related to NFPA 1720, the importance is having a fire suppression engine company on scene as the Effective Response Force is assembling, so that when the appropriate personnel arrive, the initial mitigation/attack can commence.

Figure 26: 9 Minute Bleed Response Time



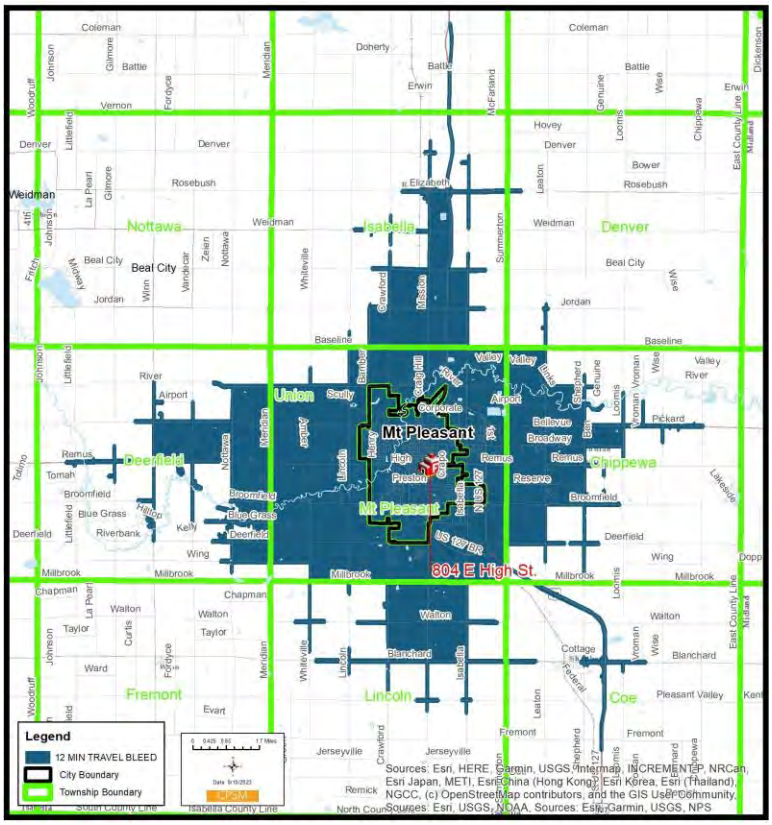


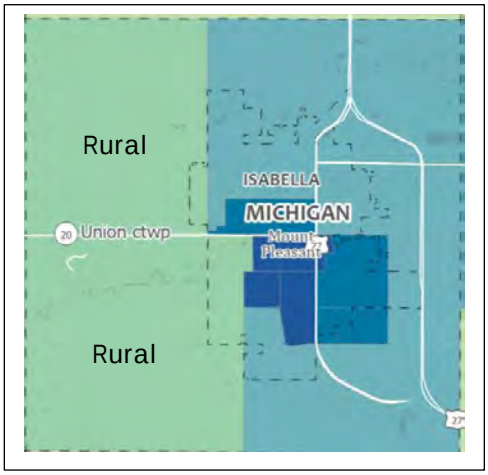


In review of the 9-minute Travel time bleed from the MPFD facility, the entire city is covered as well as the suburban areas of the township, and the more concentrated areas of demand in both the city and the township.

The next map looks at 12-minute travel times. In this map the entire city and nearly 100% of the township is covered. As a note, the NFPA 1720 benchmark for assembling an initial Effective Response Force (and having a fire suppression engine company) is 14 minutes.

Figure 27: 12 Minute Bleed Response Time





Automatic and Mutual Aid

Automatic aid is a system whereby fire, rescue, and EMS units respond automatically to another community through agreement based on proximity to the incident of resources. Mutual aid is a system whereby surrounding communities provide fire, rescue, and EMS resources to another community through agreement and specific request from the jurisdiction in need or resources (not automatically and case by case). In an automatic aid scenario, resources from neighboring jurisdictions are built into run cards in the home jurisdiction for again, an automatic response; this aid is designed to supplement and bolster the Effective Response Force of the home jurisdiction.

MPFD has automatic aid with several surrounding departments, described in this section. MPFD reciprocates automatic mutual aid with these departments and jurisdictions as well.

According to ISO's Fire Suppression Rating Schedule (FSRS), automatic aid is considered in the review as assistance dispatched automatically by contractual agreement between two communities or fire districts. That differs from mutual aid or assistance arranged case by case. ISO will recognize an Automatic Aid plan under the following conditions:

- It must be prearranged for first alarm response according to a defined plan. It is preferable to have a written agreement, but ISO may also recognize demonstrated performance.
- The aid must be dispatched to all reported structure fires on the initial alarm.
- The aid must be provided 24 hours a day, 365 days a year.

City of Mt. Pleasant Automatic Aid Assignments-Incoming Fire Departments

Shepherd Tri-Township Fire Department is requested for automatic aid for fires in any of the following buildings. Response is with an engine (4 personnel) and a rescue (2 personnel).

Building Name	Address	Height
Laurels of Mt. Pleasant	400 S. Crapo	1 Story
Maplewood	1945 Churchill Blvd.	1 Story
McLaren Central	1221 South Drive	3 Stories
Medical Care Facility	1222 North Drive	3 Stories
Michigan Hospital		
Riverview Apartments	1 Mosher Street	10 Stories
Tender Care	1524 Portabella Trail	1 Story
Winchester Towers	2001 Elva	7 Stories

Buildings at Central Michigan University

Building Name	Address	Height
Anspach	1329 S. Washington	
Brooks Hall	200 E. Library Dr.	
Campbell Hall	212 W. Broomfield	5 Stories
Carey Hall	202 W. Broomfield	8 Stories
Celani Hall	303 E. Broomfield	5 Stories
CMU Bio Science	1455 Calumet Ct. 5 Stories	85' tall
Cobb Hall	204 W. Broomfield	8 Stories
Courtyard Marriott	2400 E. Campus Dr.	6 Stories
Dow Science Building	201 E. Ottawa Ct.	
Education Building	195 Ojibway Court	5 Stories
Education Building	195 E. Obijway Ct.	
Fabiano Hall	300 E. Ojibway Court	5 Stories
Finch Hall	1275 S. Franklin St.	
Health Professions Bld.	1280 S. East Campus Dr.	
Kessler Hall	208 W. Broomfield	5 Stories
Kulhavi Hall	210 W. Broomfield	5 Stories
Park Library	250 E. Preston St.	
Rose Arena	280 E. Broomfield St.	
Rose Center	220 E. Broomfield St.	
SAC	360 E. Broomfield St.	
Troutman Hall	206 W. Broomfield	8 Stories
Warriner Hall	1200 S. Franklin	6 Stories
Wheeler Hall	200 W. Broomfield	8 Stories

Tribal Fire Department is requested for automatic aid for any calls for service in the following buildings. Tribal will respond with their normal structure fire incident complement.

Building Name	Address	Height
Soaring Eagle Inn	5665 E. Pickard Rd	3 Stories
Tribal Warehouse	2710 Makawa Rd	1 Story

Shepherd Tri-Township Fire Department and Tribal Fire Department are requested for automatic mutual aid for fires in the following building. Shepherd Tri-Township will respond with an engine (4 personnel) and a rescue (2 personnel). Tribal Fie Department will respond with their normal structure fire incident complement.

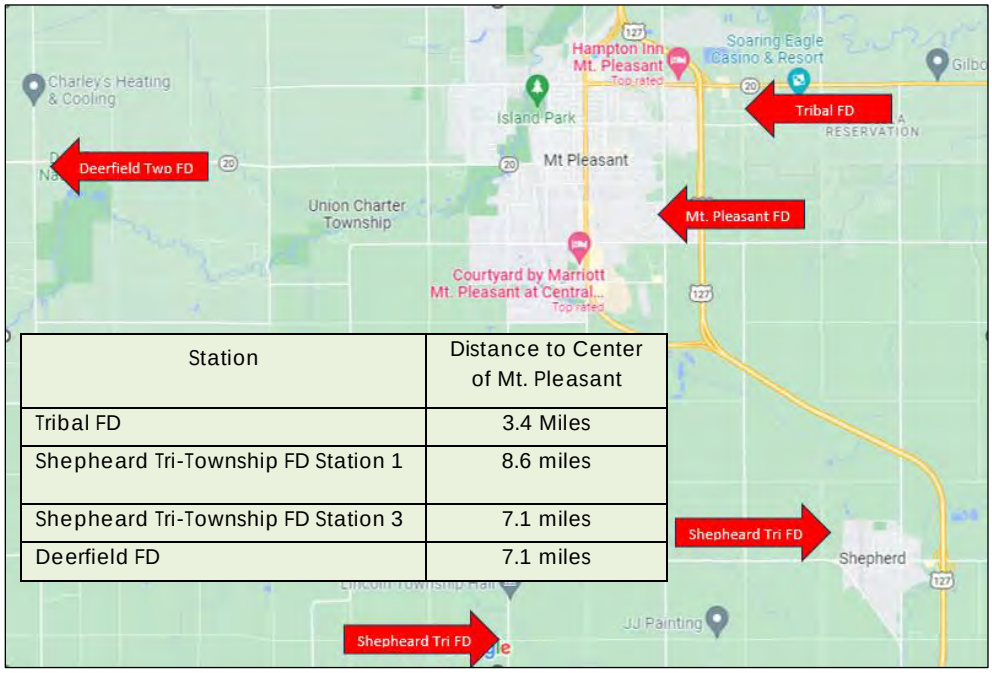
Building Name	Address	Height
Prestige Center	5785 E. Broadway	1 Story

Deerfield Fire Department is requested for automatic mutual aid for fires in predetermined locations in the MPFD western coverage area. Central Dispatch will automatically notify the Deerfield Fire Department who will respond with an engine (4 personnel) and 1 person in a tender (non-hydrant areas)

Building Name	Address	Height
Crestwood Village	2378 S. Lincoln Rd.	1 Story
Green Acres	1805 & 1811 E. Remus Rd.	1 Story
New Hope	702 E. Remus Rd.	1 Story

The next figure illustrates the location of the automatic aid departments.

Figure 28: Automatic Mutual Aid Department Locations



Station	Distance to Center of Mt. Pleasant
Tribal FD	3.4 Miles
Shepheard Tri-Township FD Station 1	8.6 miles
Shepheard Tri-Township FD Station 3	7.1 miles
Deerfield FD	7.1 miles

Recommendation:

CPSM recommends the MPFD continue with reciprocal automatic and mutual aid agreements as they provide a valuable boost to assembling an Effective Response Force for structural fires and multi-unit responses, and as well improve the overall resiliency of the MPFD.

End of Report

CPSM®
Center for Public Safety Management, LLC

Public Protection Classification (PPC©) Summary Report

Mount Pleasant

FPSA MICHIGAN

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Introduction

ISO collects and evaluates information from communities in the United States on their structure fire suppression capabilities. The data is analyzed using our Fire Suppression Rating Schedule (FSRS) and then a Public Protection Classification (PPC©) grade is assigned to the community. The surveys are conducted whenever it appears that there is a possibility of a PPC change. As such, the PPC program provides important, up-to-date information about fire protection services throughout the country.

The FSRS recognizes fire protection features only as they relate to suppression of first alarm structure fires. In many communities, fire suppression may be only a small part of the fire department's overall responsibility. ISO recognizes the dynamic and comprehensive duties of a community's fire service, and understands the complex decisions a community must make in planning and delivering emergency services. However, in developing a community's PPC grade, only features related to reducing property losses from structural fires are evaluated. Multiple alarms, simultaneous incidents and life safety are not considered in this evaluation. The PPC program evaluates the fire protection for small to average size buildings. Specific properties with a Needed Fire Flow in excess of 3,500 gpm are evaluated separately and assigned an individual PPC grade.

A community's investment in fire mitigation is a proven and reliable predictor of future fire losses. Statistical data on insurance losses bears out the relationship between excellent fire protection – as measured by the PPC program – and low fire losses. So, insurance companies use PPC information for marketing, underwriting, and to help establish fair premiums for homeowners and commercial fire insurance. In general, the price of fire insurance in a community with a good PPC grade is substantially lower than in a community with a poor PPC grade, assuming all other factors are equal.

ISO is an independent company that serves insurance companies, communities, fire departments, insurance regulators, and others by providing information about risk. ISO's expert staff collects information about municipal fire suppression efforts in communities throughout the United States. In each of those communities, ISO analyzes the relevant data and assigns a PPC grade – a number from 1 to 10. Class 1 represents an exemplary fire suppression program, and Class 10 indicates that the area's fire suppression program does not meet ISO's minimum criteria.

ISO's PPC program evaluates communities according to a uniform set of criteria, incorporating nationally recognized standards developed by the National Fire Protection Association and the American Water Works Association. A community's PPC grade depends on:

- **Needed Fire Flows**, which are representative building locations used to determine the theoretical amount of water necessary for fire suppression purposes.
- **Emergency Communications**, including emergency reporting, telecommunicators, and dispatching systems.

- **Fire Department**, including equipment, staffing, training, geographic distribution of fire companies, operational considerations, and community risk reduction.
- **Water Supply**, including inspection and flow testing of hydrants, alternative water supply operations, and a careful evaluation of the amount of available water compared with the amount needed to suppress fires up to 3,500 gpm.

Data Collection and Analysis

ISO has evaluated and classified over 39,000 fire protection areas across the United States using its FSRS. A combination of meetings between trained ISO field representatives and the dispatch center coordinator, community fire official, and water superintendent is used in conjunction with a comprehensive questionnaire to collect the data necessary to determine the PPC grade. In order for a community to obtain a grade better than a Class 9, three elements of fire suppression features are reviewed. These three elements are Emergency Communications, Fire Department, and Water Supply.

A review of the **Emergency Communications** accounts for 10% of the total classification. This section is weighted at **10 points,** as follows:

- Emergency Reporting 3 points
- Telecommunicators 4 points
- Dispatch Circuits 3 points

A review of the **Fire Department** accounts for 50% of the total classification. ISO focuses on a fire department's first alarm response and initial attack to minimize potential loss. The fire department section is weighted at **50 points,** as follows:

- Engine Companies 6 points
- Reserve Pumpers 0.5 points
- Pump Capacity 3 points
- Ladder/Service Companies 4 points
- Reserve Ladder/Service Trucks 0.5 points
- Deployment Analysis 10 points
- Company Personnel 15 points
- Training 9 points
- Operational considerations 2 points
- Community Risk Reduction 5.5 points (in addition to the 50 points above)

A review of the **Water Supply** system accounts for 40% of the total classification. ISO reviews the water supply a community uses to determine the adequacy for fire suppression purposes. The water supply system is weighted at **40 points,** as follows:

- Credit for Supply System 30 points
- Hydrant Size, Type & Installation 3 points
- Inspection & Flow Testing of Hydrants 7 points

There is one additional factor considered in calculating the final score – **Divergence**.

Even the best fire department will be less than fully effective if it has an inadequate water supply. Similarly, even a superior water supply will be less than fully effective if the fire department lacks the equipment or personnel to use the water. The FSRS score is subject to modification by a divergence factor, which recognizes disparity between the effectiveness of the fire department and the water supply.

The Divergence factor mathematically reduces the score based upon the relative difference between the fire department and water supply scores. The factor is introduced in the final equation.

PPC Grade

The PPC grade assigned to the community will depend on the community's score on a 100-point scale:

PPC	Points
■	90.00 or more
■	80.00 to 89.99
■	70.00 to 79.99
■	60.00 to 69.99
■	50.00 to 59.99
■	40.00 to 49.99
■	30.00 to 39.99
■	20.00 to 29.99
■	10.00 to 19.99
10	0.00 to 9.99

The classification numbers are interpreted as follows:

- Class 1 through (and including) Class 8 represents a fire suppression system that includes an FSRS creditable dispatch center, fire department, and water supply.
- Class 8B is a special classification that recognizes a superior level of fire protection in otherwise Class 9 areas. It is designed to represent a fire protection delivery system that is superior except for a lack of a water

supply system capable of the minimum FSRS fire flow criteria of 250 gpm for 2 hours.

- Class 9 is a fire suppression system that includes a creditable dispatch center, fire department but no FSRS creditable water supply.
- Class 10 does not meet minimum FSRS criteria for recognition, including areas that are beyond five road miles of a recognized fire station.

New PPC program changes effective July 1, 2014

We have revised the PPC program to capture the effects of enhanced fire protection capabilities that reduce fire loss and fire severity in Split Class 9 and Split Class 8B areas (as outlined below). This new structure benefits the fire service, community, and property owner.

New classifications
Through ongoing research and loss experience analysis, we identified additional differentiation in fire loss experience within our PPC program, which resulted in the revised classifications. We based the differing fire loss experience on the fire suppression capabilities of each community. The new PPC classes will improve the predictive value for insurers while benefiting both commercial and residential property owners. Here are the new classifications and what they mean.

Split classifications
When we develop a split classification for a community — for example 5/9 — the first number is the class that applies to properties within 5 road miles of the responding fire station and 1,000 feet of a creditable water supply, such as a fire hydrant, suction point, or dry hydrant.
The second number is the class that applies to properties within 5 road miles of a fire station but beyond 1,000 feet of a creditable water supply. We have revised the classification to reflect more precisely the risk of loss in a community, replacing Class 9 and 8B in the second part of a split classification with revised designations.

What's changed with the new classifications?
We've published the new classifications as "X" and "Y" — formerly the "9" and "8B" portion of the split classification, respectively. For example:

- A community currently displayed as a split 6/9 classification will now be a split 6/6X classification; with the "6X" denoting what was formerly classified as "9".
- Similarly, a community currently graded as a split 6/8B classification will now be a split 6/6Y classification, the "6Y" denoting what was formerly classified as "8B".
- Communities graded with single "9" or "8B" classifications will remain intact.

Prior Classification	New Classification
1/9	1/1X
2/9	2/2X
3/9	3/3X
4/9	4/4X
5/9	5/5X
6/9	6/6X
7/9	7/7X
8/9	8/8X
9	9

Prior Classification	New Classification
1/8B	1/1Y
2/8B	2/2Y
3/8B	3/3Y
4/8B	4/4Y
5/8B	5/5Y
6/8B	6/6Y
7/8B	7/7Y
8/8B	8/8Y
8B	8B

What's changed?
As you can see, we're still maintaining split classes, but it's how we represent them to insurers that's changed. The new designations reflect a reduction in fire severity and loss and have the potential to reduce property insurance premiums.

Benefits of the revised split class designations

- To the fire service, the revised designations identify enhanced fire suppression capabilities used throughout the fire protection area
- To the community, the new classes reward a community's fire suppression efforts by showing a more reflective designation
- To the individual property owner, the revisions offer the potential for decreased property insurance premiums

New water class
Our data also shows that risks located more than 5 but less than 7 road miles from a responding fire station with a creditable water source within 1,000 feet had better loss experience than those farther than 5 road miles from a responding fire station with no creditable water source. We've introduced a new classification —10W — to recognize the reduced loss potential of such properties.

What's changed with Class 10W?
Class 10W is property-specific. Not all properties in the 5-to-7-mile area around the responding fire station will qualify. The difference between Class 10 and 10W is that the
10W-graded risk or property is within 1,000 feet of a creditable water supply. Creditable water supplies include fire protection systems using hauled water in any of the split classification areas.

What's the benefit of Class 10W?
10W gives credit to risks within 5 to 7 road miles of the responding fire station and within 1,000 feet of a creditable water supply. That's reflective of the potential for reduced property insurance premiums.

What does the fire chief have to do?
Fire chiefs don't have to do anything at all. The revised classifications went in place automatically effective July 1, 2014 (July 1, 2015 for Texas).

What if I have additional questions?
Feel free to contact ISO at 800.444.4554 or email us at PPC-Cust-Serv@iso.com.

Distribution of PPC Grades

The 2020 published countrywide distribution of communities by the PPC grade is as follows:

Assistance

The PPC program offers help to communities, fire departments, and other public officials as they plan for, budget, and justify improvements. ISO is also available to assist in the understanding of the details of this evaluation.

The PPC program representatives can be reached by telephone at (800) 444-4554. The technical specialists at this telephone number have access to the details of this evaluation and can effectively speak with you about your questions regarding the PPC program. What's more, we can be reached via the internet at www.isomitigation.com/talk/.

We also have a website dedicated to our Community Hazard Mitigation Classification programs at www.isomitigation.com. Here, fire chiefs, building code officials, community leaders and other interested citizens can access a wealth of data describing the criteria used in evaluating how cities and towns are protecting residents from fire and other natural hazards. This website will allow you to learn more about the PPC program. The website provides important background information, insights about the PPC grading processes and technical documents. ISO is also pleased to offer Fire Chiefs Online — a special, secured website with information and features that can help improve your PPC grade, including a list of the Needed Fire Flows for all the commercial occupancies ISO has on file for your community. Visitors to the site can download information, see statistical results and also contact ISO for assistance.

In addition, on-line access to the FSRS and its commentaries is available to registered customers for a fee. However, fire chiefs and community chief administrative officials are given access privileges to this information without charge.

To become a registered fire chief or community chief administrative official, register at www.isomitigation.com.

PPC Review

ISO concluded its review of the fire suppression features being provided for Mount Pleasant FPSA. The resulting community classification is **Class 04/4X**.

If the classification is a single class, the classification applies to properties with a Needed Fire Flow of 3,500 gpm or less in the community. If the classification is a split class (e.g., 6/XX):

- The first class (e.g., "6" in a 6/XX) applies to properties within 5 road miles of a recognized fire station and within 1,000 feet of a fire hydrant or alternate water supply.
- The second class (XX or XY) applies to properties beyond 1,000 feet of a fire hydrant but within 5 road miles of a recognized fire station.
- Alternative Water Supply: The first class (e.g., "6" in a 6/10) applies to properties within 5 road miles of a recognized fire station with no hydrant distance requirement.
- Class 10 applies to properties over 5 road miles of a recognized fire station.
- Class 10W applies to properties within 5 to 7 road miles of a recognized fire station with a recognized water supply within 1,000 feet.
- Specific properties with a Needed Fire Flow in excess of 3,500 gpm are evaluated separately and assigned an individual classification.

FSRS Feature	Earned Credit	Credit Available
Emergency Communications		
414. Credit for Emergency Reporting	**3.00**	**3**
422. Credit for Telecommunicators	**4.00**	**4**
432. Credit for Dispatch Circuits	**2.85**	**3**
440. Credit for Emergency Communications	**9.85**	**10**
Fire Department		
513. Credit for Engine Companies	**5.48**	**6**
523. Credit for Reserve Pumpers	**0.00**	**0.50**
532. Credit for Pump Capacity	**3.00**	**3**
549. Credit for Ladder Service	**3.43**	**4**
553. Credit for Reserve Ladder and Service Trucks	**0.00**	**0.50**
561. Credit for Deployment Analysis	**5.30**	**10**
571. Credit for Company Personnel	**4.65**	**15**
581. Credit for Training	**4.11**	**9**
730. Credit for Operational Considerations	**2.00**	**2**
590. Credit for Fire Department	**27.97**	**50**
Water Supply		
616. Credit for Supply System	**26.91**	**30**
621. Credit for Hydrants	**2.99**	**3**
631. Credit for Inspection and Flow Testing	**0.00**	**7**
640. Credit for Water Supply	**29.90**	**40**
Divergence	**-3.76**	**--**
1050. Community Risk Reduction	**3.95**	**5.50**
Total Credit	**67.91**	**105.50**

Emergency Communications

Ten percent of a community's overall score is based on how well the communications center receives and dispatches fire alarms. Our field representative evaluated:

- Communications facilities provided for the general public to report structure fires
- Enhanced 9-1-1 Telephone Service including wireless
- Computer-aided dispatch (CAD) facilities
- Alarm receipt and processing at the communication center
- Training and certification of telecommunicators
- Facilities used to dispatch fire department companies to reported structure fires

	Earned Credit	Credit Available
414. Credit Emergency Reporting	**3.00**	3
422. Credit for Telecommunicators	**4.00**	4
432. Credit for Dispatch Circuits	**2.85**	3
Item 440. Credit for Emergency Communications:	**9.85**	**10**

Item 414 - Credit for Emergency Reporting (3 points)

The first item reviewed is Item 414 "Credit for Emergency Reporting (CER)". This item reviews the emergency communication center facilities provided for the public to report fires including 911 systems (Basic or Enhanced), Wireless Phase I and Phase II, Voice over Internet Protocol, Computer Aided Dispatch and Geographic Information Systems for automatic vehicle location. ISO uses National Fire Protection Association (NFPA) 1221, *Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems* as the reference for this section.

Item 410. Emergency Reporting (CER)	Earned Credit	Credit Available
A./B. Basic 9-1-1, Enhanced 9-1-1 or No 9-1-1 For maximum credit, there should be an Enhanced 9-1-1 system, Basic 9-1-1 and No 9-1-1 will receive partial credit.	**20.00**	**20**
1. E9-1-1 Wireless Wireless Phase I using Static ALI (automatic location identification) Functionality (10 points); Wireless Phase II using Dynamic ALI Functionality (15 points); Both available will be 25 points	**25.00**	**25**
2. E9-1-1 Voice over Internet Protocol (VoIP) Static VoIP using Static ALI Functionality (10 points); Nomadic VoIP using Dynamic ALI Functionality (15 points); Both available will be 25 points	**25.00**	**25**
3. Computer Aided Dispatch Basic CAD (5 points); CAD with Management Information System (5 points); CAD with Interoperability (5 points)	**15.00**	**15**
4. Geographic Information System (GIS/AVL) The PSAP uses a fully integrated CAD/GIS management system with automatic vehicle location (AVL) integrated with a CAD system providing dispatch assignments. The individual fire departments being dispatched do not need GIS/AVL capability to obtain this credit.	**15.00**	**15**
Review of Emergency Reporting total:	**100.00**	**100**

Item 422- Credit for Telecommunicators (4 points)

The second item reviewed is Item 422 "Credit for Telecommunicators (TC)". This item reviews the number of Telecommunicators on duty at the center to handle fire calls and other emergencies. All emergency calls including those calls that do not require fire department action are reviewed to determine the proper staffing to answer emergency calls and dispatch the appropriate emergency response. The 2013 Edition of NFPA 1221, *Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems,* recommends that ninety-five percent of emergency calls shall be answered within 15 seconds and ninety-nine percent of emergency calls shall be answered within 40 seconds. In addition, NFPA recommends that eighty percent of emergency alarm processing shall be completed within 60 seconds and ninety-five percent of alarm processing shall be completed within 106 seconds of answering the call.

To receive full credit for operators on duty, ISO must review documentation to show that the communication center meets NFPA 1221 call answering and dispatch time performance measurement standards. This documentation may be in the form of performance statistics or other performance measurements compiled by the 9-1-1 software or other software programs that are currently in use such as Computer Aided Dispatch (CAD) or Management Information System (MIS).

Item 420. Telecommunicators (CTC)	Earned Credit	Credit Available
A1. Alarm Receipt (AR) Receipt of alarms shall meet the requirements in accordance with the criteria of NFPA 1221	**20.00**	**20**
A2. Alarm Processing (AP) Processing of alarms shall meet the requirements in accordance with the criteria of NFPA 1221	**20.00**	**20**
B. Emergency Dispatch Protocols (EDP) Telecommunicators have emergency dispatch protocols (EDP) containing questions and a decision-support process to facilitate correct call categorization and prioritization.	**20.00**	**20**
C. Telecommunicator Training and Certification (TTC) Telecommunicators meet the qualification requirements referenced in NFPA 1061, *Standard for Professional Qualifications for Public Safety Telecommunicator,* and/or the Association of Public-Safety Communications Officials - International (APCO) *Project 33.* Telecommunicators are certified in the knowledge, skills, and abilities corresponding to their job functions.	**20.00**	**20**
D. Telecommunicator Continuing Education and Quality Assurance (TQA) Telecommunicators participate in continuing education and/or in-service training and quality-assurance programs as appropriate for their positions	**20.00**	**20**
Review of Telecommunicators total:	**100.00**	**100**

Item 432 - Credit for Dispatch Circuits (3 points)

The third item reviewed is Item 432 "Credit for Dispatch Circuits (CDC)". This item reviews the dispatch circuit facilities used to transmit alarms to fire department members. A "Dispatch Circuit" is defined in NFPA 1221 as "A circuit over which an alarm is transmitted from the communications center to an emergency response facility (ERF) or emergency response units (ERUs) to notify ERUs to respond to an emergency". All fire departments (except single fire station departments with full-time firefighter personnel receiving alarms directly at the fire station) need adequate means of notifying all firefighter personnel of the location of reported structure fires. The dispatch circuit facilities should be in accordance with the general criteria of NFPA 1221. "Alarms" are defined in this Standard as "A signal or message from a person or device indicating the existence of an emergency or other situation that requires action by an emergency response agency".

There are two different levels of dispatch circuit facilities provided for in the Standard – a primary dispatch circuit and a secondary dispatch circuit. In jurisdictions that receive 730 alarms or more per year (average of two alarms per 24-hour period), two separate and dedicated dispatch circuits, a primary and a secondary, are needed. In jurisdictions receiving fewer than 730 alarms per year, a second dedicated dispatch circuit is not needed. Dispatch circuit facilities installed but not used or tested (in accordance with the NFPA Standard) receive no credit.

The score for Credit for Dispatch Circuits (CDC) is influenced by monitoring for integrity of the primary dispatch circuit. There are up to 0.90 points available for this Item. Monitoring for integrity involves installing automatic systems that will detect faults and failures and send visual and audible indications to appropriate communications center (or dispatch center) personnel. ISO uses NFPA 1221 to guide the evaluation of this item. ISO's evaluation also includes a review of the communication system's emergency power supplies.

Item 432 "Credit for Dispatch Circuits (CDC)" = 2.85 points

Fire Department

Fifty percent of a community's overall score is based upon the fire department's structure fire suppression system. ISO's field representative evaluated:

- Engine and ladder/service vehicles including reserve apparatus
- Equipment carried
- Response to reported structure fires
- Deployment analysis of companies
- Available and/or responding firefighters
- Training

	Earned Credit	Credit Available
513. Credit for Engine Companies	**5.48**	6
523. Credit for Reserve Pumpers	**0.00**	0.5
532. Credit for Pumper Capacity	**3.00**	3
549. Credit for Ladder Service	**3.43**	4
553. Credit for Reserve Ladder and Service Trucks	**0.00**	0.5
561. Credit for Deployment Analysis	**5.30**	10
571. Credit for Company Personnel	**4.65**	15
581. Credit for Training	**4.11**	9
730. Credit for Operational Considerations	**2.00**	2
Item 590. Credit for Fire Department:	**27.97**	**50**

Basic Fire Flow

The Basic Fire Flow for the community is determined by the review of the Needed Fire Flows for selected buildings in the community. The fifth largest Needed Fire Flow is determined to be the Basic Fire Flow. The Basic Fire Flow has been determined to be 3500 gpm.

Item 513 - Credit for Engine Companies (6 points)

The first item reviewed is Item 513 "Credit for Engine Companies (CEC)". This item reviews the number of engine companies, their pump capacity, hose testing, pump testing and the equipment carried on the in-service pumpers. To be recognized, pumper apparatus must meet the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus* which include a minimum 250 gpm pump, an emergency warning system, a 300 gallon water tank, and hose. At least 1 apparatus must have a permanently mounted pump rated at 750 gpm or more at 150 psi.

The review of the number of needed pumpers considers the response distance to built-upon areas; the Basic Fire Flow; and the method of operation. Multiple alarms, simultaneous incidents, and life safety are not considered.

The greatest value of A, B, or C below is needed in the fire district to suppress fires in structures with a Needed Fire Flow of 3,500 gpm or less: **3 engine companies**

- **1 engine companies** to provide fire suppression services to areas to meet NFPA 1710 criteria or within 1½ miles.
- **3 engine companies** to support a Basic Fire Flow of 3500 gpm.
- **3 engine companies** based upon the fire department's method of operation to provide a minimum two engine response to all first alarm structure fires.

The FSRS recognizes that there are **3 engine companies** in service.

The FSRS also reviews Automatic Aid. Automatic Aid is considered in the review as assistance dispatched automatically by contractual agreement between two communities or fire districts. That differs from mutual aid or assistance arranged case by case. ISO will recognize an Automatic Aid plan under the following conditions:

- It must be prearranged for first alarm response according to a definite plan. It is preferable to have a written agreement, but ISO may recognize demonstrated performance.
- The aid must be dispatched to all reported structure fires on the initial alarm.
- The aid must be provided 24 hours a day, 365 days a year.

FSRS Item 512.D "Automatic Aid Engine Companies" responding on first alarm and meeting the needs of the city for basic fire flow and/or distribution of companies are factored based upon the value of the Automatic Aid plan (up to 1.00 can be used as the factor). The Automatic Aid factor is determined by a review of the Automatic Aid provider's communication facilities, how they receive alarms from the graded area, inter-department training between fire departments, and the fire ground communications capability between departments.

For each engine company, the credited Pump Capacity (PC), the Hose Carried (HC), the Equipment Carried (EC) all contribute to the calculation for the percent of credit the FSRS provides to that engine company.

Item 513 "Credit for Engine Companies (CEC)" = 5.48 points

Item 523 - Credit for Reserve Pumpers (0.50 points)

The item is Item 523 "Credit for Reserve Pumpers (CRP)". This item reviews the number and adequacy of the pumpers and their equipment. The number of needed reserve pumpers is 1 for each 8 needed engine companies determined in Item 513, or any fraction thereof.

Item 523 "Credit for Reserve Pumpers (CRP)" = 0.00 points

Item 532 – Credit for Pumper Capacity (3 points)

The next item reviewed is Item 532 "Credit for Pumper Capacity (CPC)". The total pump capacity available should be sufficient for the Basic Fire Flow of 3500 gpm. The maximum needed pump capacity credited is the Basic Fire Flow of the community.

Item 532 "Credit for Pumper Capacity (CPC)" = 3.00 points

Item 549 – Credit for Ladder Service (4 points)

The next item reviewed is Item 549 "Credit for Ladder Service (CLS)". This item reviews the number of response areas within the city with 5 buildings that are 3 or more stories or 35 feet or more in height, or with 5 buildings that have a Needed Fire Flow greater than 3,500 gpm, or any combination of these criteria. The height of all buildings in the city, including those protected by automatic sprinklers, is considered when determining the number of needed ladder companies. Response areas not needing a ladder company should have a service company. Ladders, tools and equipment normally carried on ladder trucks are needed not only for ladder

operations but also for forcible entry, ventilation, salvage, overhaul, lighting and utility control.

The number of ladder or service companies, the height of the aerial ladder, aerial ladder testing and the equipment carried on the in-service ladder trucks and service trucks is compared with the number of needed ladder trucks and service trucks and an FSRS equipment list. Ladder trucks must meet the general criteria of NFPA 1901, *Standard for Automotive Fire Apparatus* to be recognized.

The number of needed ladder-service trucks is dependent upon the number of buildings 3 stories or 35 feet or more in height, buildings with a Needed Fire Flow greater than 3,500 gpm, and the method of operation.

The FSRS recognizes that there are **1 ladder companies** in service. These companies are needed to provide fire suppression services to areas to meet NFPA 1710 criteria or within 2½ miles and the number of buildings with a Needed Fire Flow over 3,500 gpm or 3 stories or more in height, or the method of operation.

The FSRS recognizes that there are **0 service companies** in service.

Item 549 "Credit for Ladder Service (CLS)" = 3.43 points

Item 553 – Credit for Reserve Ladder and Service Trucks (0.50 points)

The next item reviewed is Item 553 "Credit for Reserve Ladder and Service Trucks (CRLS)". This item considers the adequacy of ladder and service apparatus when one (or more in larger communities) of these apparatus are out of service. The number of needed reserve ladder and service trucks is 1 for each 8 needed ladder and service companies that were determined to be needed in Item 540, or any fraction thereof.

Item 553 "Credit for Reserve Ladder and Service Trucks (CRLS)" = 0.00 points

Item 561 – Deployment Analysis (10 points)

Next, Item 561 "Deployment Analysis (DA)" is reviewed. This Item examines the number and adequacy of existing engine and ladder-service companies to cover built-upon areas of the city.

To determine the Credit for Distribution, first the Existing Engine Company (EC) points and the Existing Engine Companies (EE) determined in Item 513 are considered along with Ladder Company Equipment (LCE) points, Service Company Equipment (SCE) points, Engine-Ladder Company Equipment (ELCE) points, and Engine-Service Company Equipment (ESCE) points determined in Item 549.

Secondly, as an alternative to determining the number of needed engine and ladder/service companies through the road-mile analysis, a fire protection area may use the results of a systematic performance evaluation. This type of evaluation analyzes computer-aided dispatch (CAD) history to demonstrate that, with its current deployment of companies, the fire department meets the time constraints for initial arriving engine and initial full alarm assignment in accordance with the general criteria of in NFPA 1710, *Standard for the*

Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.

A determination is made of the percentage of built upon area within 1½ miles of a first-due engine company and within 2½ miles of a first-due ladder-service company.

Item 561 "Credit Deployment Analysis (DA)" = 5.30 points

Item 571 – Credit for Company Personnel (15 points)

Item 571 "Credit for Company Personnel (CCP)" reviews the average number of existing firefighters and company officers available to respond to reported first alarm structure fires in the city.

The on-duty strength is determined by the yearly average of total firefighters and company officers on-duty considering vacations, sick leave, holidays, "Kelley" days and other absences. When a fire department operates under a minimum staffing policy, this may be used in lieu of determining the yearly average of on-duty company personnel.

Firefighters on apparatus not credited under Items 513 and 549 that regularly respond to reported first alarms to aid engine, ladder, and service companies are included in this item as increasing the total company strength.

Firefighters staffing ambulances or other units serving the general public are credited if they participate in fire-fighting operations, the number depending upon the extent to which they are available and are used for response to first alarms of fire.

On-Call members are credited on the basis of the average number staffing apparatus on first alarms. Off-shift career firefighters and company officers responding on first alarms are considered on the same basis as on-call personnel. For personnel not normally at the fire station, the number of responding firefighters and company officers is divided by 3 to reflect the time needed to assemble at the fire scene and the reduced ability to act as a team due to the various arrival times at the fire location when compared to the personnel on-duty at the fire station during the receipt of an alarm.

The number of Public Safety Officers who are positioned in emergency vehicles within the jurisdiction boundaries may be credited based on availability to respond to first alarm structure fires. In recognition of this increased response capability the number of responding Public Safety Officers is divided by 2.

The average number of firefighters and company officers responding with those companies credited as Automatic Aid under Items 513 and 549 are considered for either on-duty or on- call company personnel as is appropriate. The actual number is calculated as the average number of company personnel responding multiplied by the value of AA Plan determined in Item 512.D.

The maximum creditable response of on-duty and on-call firefighters is 12, including company officers, for each existing engine and ladder company and 6 for each existing service company.

Chief Officers are not creditable except when more than one chief officer responds to alarms; then extra chief officers may be credited as firefighters if they perform company duties.

The FSRS recognizes **3.78 on-duty personnel** and an average of **11.00 on-call personnel** responding on first alarm structure fires.

Item 571 "Credit for Company Personnel (CCP)" = 4.65 points

Item 581 – Credit for Training (9 points)

Training	Earned Credit	Credit Available
A. Facilities, and Use For maximum credit, each firefighter should receive 18 hours per year in structure fire related subjects as outlined in NFPA 1001.	**0.00**	**35**
B. Company Training For maximum credit, each firefighter should receive 16 hours per month in structure fire related subjects as outlined in NFPA 1001.	**9.92**	**25**
C. Classes for Officers For maximum credit, each officer should be certified in accordance with the general criteria of NFPA 1021. Additionally, each officer should receive 12 hours of continuing education on or off site.	**12.00**	**12**
D. New Driver and Operator Training For maximum credit, each new driver and operator should receive 60 hours of driver/operator training per year in accordance with NFPA 1002 and NFPA 1451.	**4.67**	**5**
E. Existing Driver and Operator Training For maximum credit, each existing driver and operator should receive 12 hours of driver/operator training per year in accordance with NFPA 1002 and NFPA 1451.	**5.00**	**5**
F. Training on Hazardous Materials For maximum credit, each firefighter should receive 6 hours of training for incidents involving hazardous materials in accordance with NFPA 472.	**1.00**	**1**
G. Recruit Training For maximum credit, each firefighter should receive 240 hours of structure fire related training in accordance with NFPA 1001 within the first year of employment or tenure.	**5.00**	**5**
H. Pre-Fire Planning Inspections For maximum credit, pre-fire planning inspections of each commercial, industrial, institutional, and other similar type building (all buildings except 1-4 family dwellings) should be made annually by company members. Records of inspections should include up-to date notes and sketches.	**8.04**	**12**

Item 580 "Credit for Training (CT)" = 4.11 points

Item 730 – Operational Considerations (2 points)

Item 730 "Credit for Operational Considerations (COC)" evaluates fire department standard operating procedures and incident management systems for emergency operations involving structure fires.

Operational Considerations	Earned Credit	Credit Available
Standard Operating Procedures The department should have established SOPs for fire department general emergency operations	**50**	**50**
Incident Management Systems The department should use an established incident management system (IMS)	**50**	**50**
Operational Considerations total:	**100**	**100**

Item 730 "Credit for Operational Considerations (COC)" = 2.00 points

Water Supply

Forty percent of a community's overall score is based on the adequacy of the water supply system. The ISO field representative evaluated:

- the capability of the water distribution system to meet the Needed Fire Flows at selected locations up to 3,500 gpm.
- size, type and installation of fire hydrants.
- inspection and flow testing of fire hydrants.

	Earned Credit	Credit Available
616. Credit for Supply System	**26.91**	30
621. Credit for Hydrants	**2.99**	3
631. Credit for Inspection and Flow Testing	**0.00**	7
Item 640. Credit for Water Supply:	**29.90**	**40**

Item 616 – Credit for Supply System (30 points)

The first item reviewed is Item 616 "Credit for Supply System (CSS)". This item reviews the rate of flow that can be credited at each of the Needed Fire Flow test locations considering the supply works capacity, the main capacity and the hydrant distribution. The lowest flow rate of these items is credited for each representative location. A water system capable of delivering 250 gpm or more for a period of two hours plus consumption at the maximum daily rate at the fire location is considered minimum in the ISO review.

Where there are 2 or more systems or services distributing water at the same location, credit is given on the basis of the joint protection provided by all systems and services available.

The supply works capacity is calculated for each representative Needed Fire Flow test location, considering a variety of water supply sources. These include public water supplies, emergency supplies (usually accessed from neighboring water systems), suction supplies (usually evidenced by dry hydrant installations near a river, lake or other body of water), and supplies developed by a fire department using large diameter hose or vehicles to shuttle water from a source of supply to a fire site. The result is expressed in gallons per minute (gpm).

The normal ability of the distribution system to deliver Needed Fire Flows at the selected building locations is reviewed. The results of a flow test at a representative test location will indicate the ability of the water mains (or fire department in the case of fire department supplies) to carry water to that location.

The hydrant distribution is reviewed within 1,000 feet of representative test locations measured as hose can be laid by apparatus.

For maximum credit, the Needed Fire Flows should be available at each location in the district. Needed Fire Flows of 2,500 gpm or less should be available for 2 hours; and Needed Fire Flows of 3,000 and 3,500 gpm should be obtainable for 3 hours.

Item 616 "Credit for Supply System (CSS)" = 26.91 points

Item 621 – Credit for Hydrants (3 points)

The second item reviewed is Item 621 "Credit for Hydrants (CH)". This item reviews the number of fire hydrants of each type compared with the total number of hydrants.

There are a total of 1644 hydrants in the graded area.

620. Hydrants, - Size, Type and Installation	Number of Hydrants
A. With a 6 -inch or larger branch and a pumper outlet with or without 2½ - inch outlets	1631
B. With a 6 -inch or larger branch and no pumper outlet but two or more 2½ -inch outlets, or with a small foot valve, or with a small barrel	9
C./D. With only a 2½ -inch outlet or with less than a 6 -inch branch	4
E./F. Flush Type, Cistern, or Suction Point	0

Item 621 "Credit for Hydrants (CH)" = 2.99 points

Item 630 – Credit for Inspection and Flow Testing (7 points)

The third item reviewed is Item 630 "Credit for Inspection and Flow Testing (CIT)". This item reviews the fire hydrant inspection frequency, and the completeness of the inspections. Inspection of hydrants should be in accordance with AWWA M-17, *Installation, Field Testing and Maintenance of Fire Hydrants.*

Frequency of Inspection (FI): Average interval between the 3 most recent inspections.

Frequency	Points
1 year	30
2 years	20
3 years	10
4 years	5
5 years or more	No Credit

Note: The points for inspection frequency are reduced by 10 points if the inspections are incomplete or do not include a flushing program. An additional reduction of 10 points are made if hydrants are not subjected to full system pressure during inspections. If the inspection of cisterns or suction points does not include actual drafting with a pumper, or back-flushing for dry hydrants, 20 points are deducted.

Total points for Inspections = 0.00 points

Frequency of Fire Flow Testing (FF): Average interval between the 3 most recent inspections.

Frequency	Points
5 years	40
6 years	30
7 years	20
8 years	10
9 years	5
10 years or more	No Credit

Total points for Fire Flow Testing = 0.00 points

Item 631 "Credit for Inspection and Fire Flow Testing (CIT)" = 0.00 points

Divergence = -3.76

The Divergence factor mathematically reduces the score based upon the relative difference between the fire department and water supply scores. The factor is introduced in the final equation.

Community Risk Reduction

	Earned Credit	Credit Available
1025. Credit for Fire Prevention and Code Enforcement (CPCE)	**1.57**	2.2
1033. Credit for Public Fire Safety Education (CFSE)	**1.36**	2.2
1044. Credit for Fire Investigation Programs (CIP)	**1.02**	1.1
Item 1050. Credit for Community Risk Reduction	**3.95**	**5.50**

Item 1025 – Credit for Fire Prevention Code Adoption and Enforcement (2.2 points)	**Earned Credit**	**Credit Available**
Fire Prevention Code Regulations (PCR) Evaluation of fire prevention code regulations in effect.	**2.76**	**10**
Fire Prevention Staffing (PS) Evaluation of staffing for fire prevention activities.	**6.06**	**8**
Fire Prevention Certification and Training (PCT) Evaluation of the certification and training of fire prevention code enforcement personnel.	**3.86**	**6**
Fire Prevention Programs (PCP) Evaluation of fire prevention programs.	**15.82**	**16**
Review of Fire Prevention Code and Enforcement (CPCE) subtotal:	**28.50**	**40**

Item 1033 – Credit for Public Fire Safety Education (2.2 points)	**Earned Credit**	**Credit Available**
Public Fire Safety Educators Qualifications and Training (FSQT) Evaluation of public fire safety education personnel training and qualification as specified by the authority having jurisdiction.	**5.00**	**10**
Public Fire Safety Education Programs (FSP) Evaluation of programs for public fire safety education.	**19.78**	**30**
Review of Public Safety Education Programs (CFSE) subtotal:	**24.78**	**40**

Item 1044 – Credit for Fire Investigation Programs (1.1 points)	Earned Credit	Credit Available
Fire Investigation Organization and Staffing (IOS) Evaluation of organization and staffing for fire investigations.	8.00	8
Fire Investigator Certification and Training (IQT) Evaluation of fire investigator certification and training.	4.50	6
Use of National Fire Incident Reporting System (IRS) Evaluation of the use of the National Fire Incident Reporting System (NFIRS) for the 3 years before the evaluation.	6.00	6
Review of Fire Investigation Programs (CIP) subtotal:	18.50	20

Summary of PPC Review for Mount Pleasant FPSA

FSRS Item	Earned Credit	Credit Available
Emergency Communications		
414. Credit for Emergency Reporting	3.00	3
422. Credit for Telecommunicators	4.00	4
432. Credit for Dispatch Circuits	2.85	3
440. Credit for Emergency Communications	9.85	10
Fire Department		
513. Credit for Engine Companies	5.48	6
523. Credit for Reserve Pumpers	0.00	0.5
532. Credit for Pumper Capacity	3.00	3
549. Credit for Ladder Service	3.43	4
553. Credit for Reserve Ladder and Service Trucks	0.00	0.5
561. Credit for Deployment Analysis	5.30	10
571. Credit for Company Personnel	4.65	15
581. Credit for Training	4.11	9
730. Credit for Operational Considerations	2.00	2
590. Credit for Fire Department	27.97	50
Water Supply		
616. Credit for Supply System	26.91	30
621. Credit for Hydrants	2.99	3
631. Credit for Inspection and Flow Testing	0.00	7
640. Credit for Water Supply	29.90	40
Divergence	-3.76	--
1050. Community Risk Reduction	3.95	5.50
Total Credit	67.91	105.5

Final Community Classification = 04/4X

DIVISION OF PUBLIC SAFETY
CITY OF MT. PLEASANT

804 E. High Street, Mount Pleasant, MI 48858
Phone: (989) 779-5100 Fax: (989) 773-4020

MEMORANDUM

DATE: February 7, 2024
TO: Aaron Desentz, City Manager
FROM: Paul Lauria, Director of Public Safety
SUBJECT: 2023 Electric Scooter Review

I am writing to provide a recap and review of the rentals of electric scooters (eScooters) for 2023. This memorandum summarizes statistics, accomplishments, challenges, and recommendations for the future.

EScooter companies were permitted to operate within the city for the first time in April 2023. Spin and Bird Scooters were the two companies that operated this past year. The following are combined statistics:

- Total number of scooters in operation: 200
- Total number of users: 10,354
- Total number of rides taken: 41,101
- Average ride duration: 12 minutes
- Average length of trip: 1.33 miles
- C02 avoided from displaced car trips: 6.1 metric tonnes
- eScooter (Spin or Bird) accidents with vehicles: 0
- eScooter (Spin or Bird) **reported** injures: 0

The program expanded its reach when Central Michigan University (CMU) passed their own rules and regulations for eScooters to operate on campus. CMU is conducting their own review, but their statistics were not available at the time I completed this memorandum.

There were some challenges that we experienced. These include reports of reckless operation, recovering of scooters from the Chippewa River, and improperly parked scooters.

By far the most reoccurring complaint has to do with the parking of scooters. Scooters that are left in the middle of the sidewalk or on private property have caused frustrations, inconveniences, and accessibility problems. While the companies have a 2-hour requirement to respond to these types of issues, many people felt that response was slow or none at all. If consecutive complaints were received Code Enforcement Officers or Police Officers would respond and impound the scooter. A total of 15 scooters were impounded in 2023.

There are many benefits to having scooter rental companies operate in the city. EScooters have contributed to reducing carbon emissions and they align with our city's sustainability goals. In addition, they provide a fun, convenient and low-cost solution to traverse the city as well as meet the needs of people who may not own a car. However, to some the scooters are a nuisance and are routinely parked improperly on the sidewalk and on private property. Further, they believe when the scooters are not taken care of on a 24-hour basis it makes the city look unkempt and poses safety concerns.

The eScooters have undoubtedly been a valuable addition to our city's transportation options. With the right adjustments and continued community involvement, we can build on its success and ensure it remains a convenient and sustainable mode of transit for our residents. A couple of the solutions may be designated drop off locations and/or lessen the total number of eScooter deployments.

I look forward to discussing these recommendations and the eScooters during a future city commission meeting. Please feel free to reach out if you have any questions or require further information.

Memorandum

Mt. Pleasant [meet here]

TO: Aaron Desentz
City Manager

FROM: Manuela Powidayko
Director of Planning & Community Development

DATE: March 25, 2024

SUBJECT: Planning Commission Annual Report

Each year, in accordance with State Law, the Planning Commission issues a report on its activities during the previous year. The Planning Commission approved the attached 2023 Annual Report at their meeting on March 7, 2024.

This year's annual report includes new features for the work performed by the Planning Commission and Planning and Community Development Department, including:

- Information about pre-application meetings held in 2023, as they help the City achieve Redevelopment Ready Certification status with the Michigan Economic Development Corporation, as they help with Departmental coordination, add transparency to the City's approval processes, and help streamline projects.
- Expanded project activity section to list work session items that were discussed throughout the year, the outcome of those conversations and the next steps for each item, as laid out by the Planning Commission during the discussions.
- Added a new "Special Projects" section to highlight additional work from the Department, such as the development of research projects in partnership with CMU through internships and class projects.
- Expanded the "Development Activity" section to include greater detail about the types of Special Use Permits and Site Plan Reviews that were approved, and how those projects help further the master plan goals and objectives.

Requested Action:

Receive the Annual Report.

Attachment:
1. Planning Commission Annual Report

2023 annual report

MT. PLEASANT PLANNING COMMISSION

Mt. Pleasant
[meet here]

CITY OF MT. PLEASANT
PLANNING COMMISSION - 2023

Lesley Hoenig, Chair
Christine Ortman, Vice-Chair
Andrew Devenney
Corey Friedrich
Yannis Haveles
Glen Irwin II
David Kingsworthy
Matthew Liesch
Kelli Nicholas

STAFF

Manuela Powidayko, Director of Planning and Community Development
Susan Tham, Office Professional

INTRODUCTION

This report is provided in accordance with the Michigan Planning Enabling Act, Public Act 33 of 2008. It reports the Planning Commission's operations during the 2023 calendar year and the status of planning activities.

APPLICATION SUMMARY

The following table and chart provide a summary of the number of planning applications processed by the City in 2023, as well as the previous five years.

Planning Commission Applications by Type

Application Type	2018	2019	2020	2021	2022	2023
Special Use Permits (SUPs)	14	13	14	19	19	18
Site Plan Reviews (SPRs)	12	18	15	17	19	25
Map Amendments (Rezoning)	0	2	1	1	0	0
Text Amendments	3	6	2	5	7	3
Total Applications	**29**	**39**	**32**	**42**	**45**	**46**

The Department of Planning and Community Development, together with the Building Safety, Public Safety, Downtown Development, and Public Works Departments also held 36 pre-application meetings to assist prospective applicants further their development proposals and start the different application processes triggered depending upon their scope of work. Pre-application meetings help the City achieve the main goals as a Redevelopment Ready Certified Community, as they help with Departmental coordination, add transparency to the City's approval processes, and help streamline projects. Pre-application meetings can also reduce the cost that applicants spend with paperwork, as they can address potential conflicts between ordinances and regulations and therefore have often addressed circumstances that would otherwise have resulted in an application being postponed or eventually denied. Out of those 36 meetings, 22 culminated into successful applications that were approved either administratively or by the Planning Commission in 2023. The others are under further development, many of which are planning to come forward as applications in 2024.

Planning staff has also provided several one-on-one zoning consultations throughout the year in addition to communications related to pre-application meetings.

PROJECT ACTIVITY

In 2023, the Planning Commission held twelve meetings and seven work sessions, which included the discussion of thirteen different topics that are listed below:

	WORK SESSION ITEM	STATUS
1	Master Plan update: create a corridor plan for Mission Street	Prioritized for 2024
2	Future of retail: rethink the zoning rules along Mission Street to differentiate it from Downtown regulations, with the goal to treat as a regional corridor (as opposed to a local street)	PC decided to not move forward
3	E-commerce fulfillment centers: consider it a commercial use (as opposed to industrial), ensuring support to the future of retail	PC decided to not move forward
4	Building standards in commercial districts: increase design flexibility while achieving the ordinance's and master plan's goals	Prioritized for 2024
5	Floating overlay district for large, auto-oriented uses: permit deviations from the ordinance to more easily allow such uses	PC decided to not move forward
6	Required stacking for drive-throughs: reduce lane requirements and better enable the reuse of existing non-conforming sites	PC decided to not move forward
7	Driveway widths along busy routes: align requirements to MDOT design standards without compromising pedestrian safety	Adopted in 2023
8	Institutional Uses: add transitional housing and adult daycare centers in the ordinance and flex the allowance for medical uses	Adopted in 2023
9	Applications requiring Planning Commission approval: convert residential uses permitted as Special Use Permits to "restricted uses" (as-of-right development with additional requirements)	Postponed to 2025
10	Ratio of house vs garage at frontage: add façade design flexibility and more easily enable two-car garages	Adopted in 2023
11	Alterations & enlargements of existing buildings: add flexibility to rules governing non-conformances to enable greater investment	Prioritized for 2024
12	Non-conforming uses: add flexibility to non-conforming uses to enable greater investment and business expansion	Prioritized for 2024
13	Planned Residential Development (PRD) rezoning to match the Future Land Use Map: dissolve the PRD agreement and rezone properties to more easily allow development of large vacant sites	Prioritized for 2024

Culminating from these work sessions and as shown in the chart, the Planning Commission recommended the adoption of following three zoning text changes in 2023 which are further summarized below:

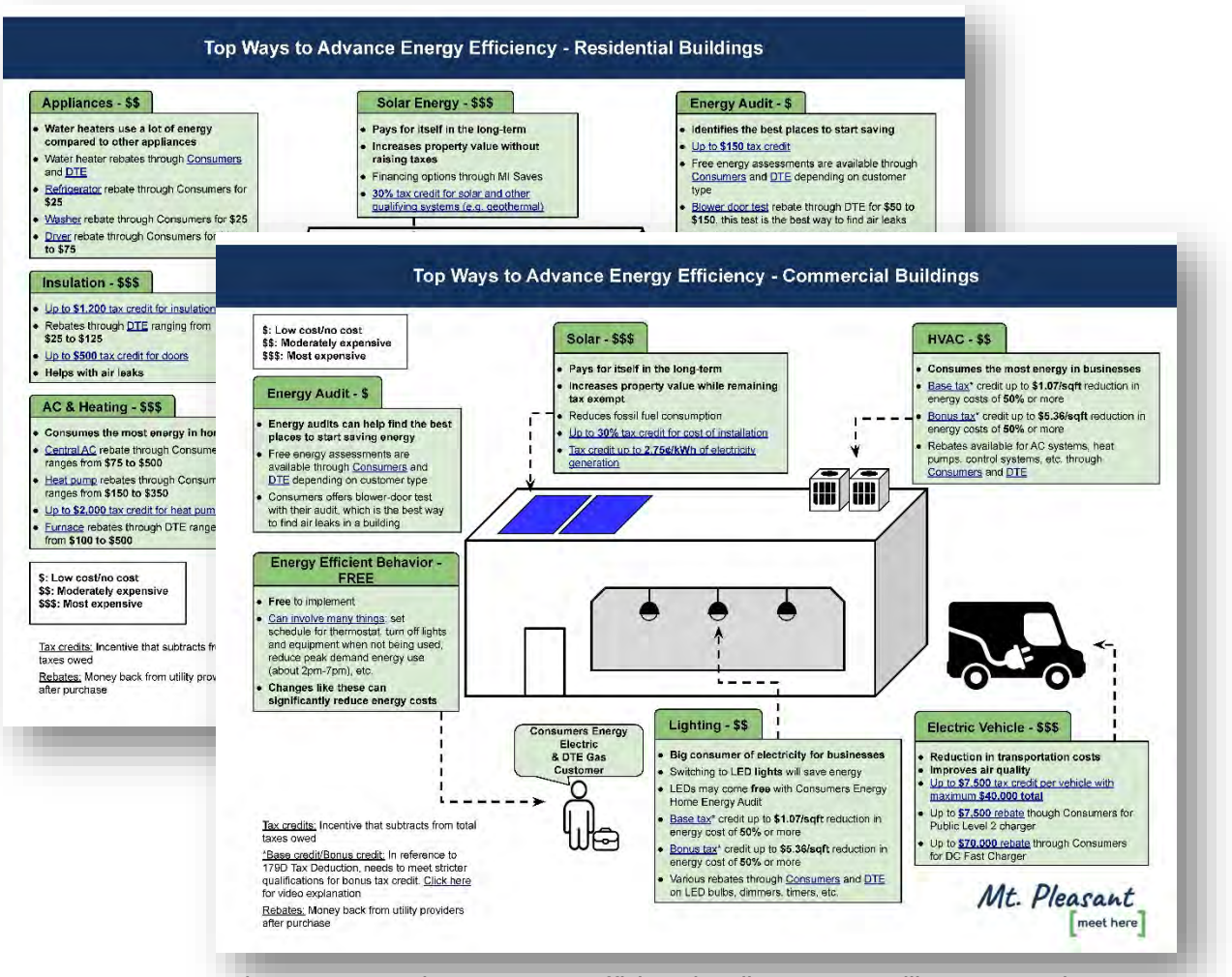
- TC 23-01 Driveway Widths: Aligned City regulations governing driveway design within residential districts and better matched such rules with Michigan Department of Transportation (MDOT) and City engineering standards for commercial properties located along Pickard, Mission and High Street (west of Mission).
- TC 23-02 House to Garage Ratio: Modified house to garage design ratio requirements to add façade design flexibility and more easily enable two-car garages across the city's residential areas.
- TC 23-03 Institutional Uses: Permitted transitional housing and adult day care centers across most of the City's zoned land, and offered greater flexibility for the sitting of medical uses.

These changes help the City up-keep with demographic changes in the Region by cutting down the development cost of starter-homes across the city's neighborhoods, and ensuring that essential services can be provided to workforce housing, homeless populations, lower-income households, and an aging population. They also help spur economic development by aligning City and State regulations, adding more zoning predictability and transparency, ultimately helping expedite the approval process of commercial development that enfronts major commercial corridors that are under MDOT's jurisdiction.

SPECIAL PROJECTS

The City has partnered with Central Michigan University throughout 2023 to further its sustainability and resiliency efforts. These projects are summarized below:

- Energy Efficiency Program: CMU (Central Michigan University) Intern Mason Squillets-Peterson compiled information about a set of financial incentives that are currently available to residential and commercial properties through rebates and tax or bonus tax credits, culminating in two easy-to-read one-pagers that are posted on the City's Building Safety webpage (one for residential and one for commercial buildings). These documents aim to help educate the public on ways they can achieve more energy efficiency. Strategies are codified from free or low cost to moderate or more expensive solutions.



One-pagers about ways to advance energy-efficient (credit: Mason Squillets-Peterson)

Mason Squillets-Peterson presenting at the July 24, 2023, City Commission Meeting

Culminating from this effort, the City adopted the PACE (Property Assessed Clean Energy) Program: a financing tool that enables cashflow positive investment in energy and water efficiency and renewable energy projects.

This internship was a partnership between CMU (led by Professor Dr. Matthew Liesch) and the City (led by the Building Safety Department in collaboration with the Department of Planning and Community Development).

- Climate Vulnerability in Mt. Pleasant: CMU students from the "Adapting to Our Changing Climate" course led by Dr. Matthew Liesch, who is also a Planning Commissioner and Chairperson of CMU's Geography & Environmental Studies, came to City Hall to present data about Mt Pleasant's vulnerability to climate change and what are the key areas the City must focus when developing a climate action plan. City staff and members of the Planning Commission were present at the meeting. This data will support the creation of a Climate Change Preparedness Plan (more specifically the City of Mt Pleasant Risk assessment and vulnerability analysis), which is one of the main goals laid out by the City Commission in 2024.

Students highlighted how flooding from extreme precipitation is the main climate threat to our community. However, students also analyzed the City's heat vulnerability and its exposure to droughts.

CMU Students presenting at the City Commission Chambers on December 11, 2023

This class project was designed in partnership with the City's Department of Planning and Community Development.

- Impermeable Surface Conditions on South Mission Street & Student Shopper Perception: CMU students from the "Socio-Ecological Resiliency" course led by Dr. Mark Francek, came to City Hall to present new impervious surface data that students collected along South Mission Street documenting how high concentrations of impermeable surfaces impact flooding probability and shopping desirability. City staff

and members of the Planning Commission and the Downtown Development Authority (DDA Mission-Pickard) Board were present at the meeting.

- 

Students found that 67% of the area of lots that enfront South Mission is impervious, increasing flooding probability, runoff pollution and groundwater recharge. Students also captured high noise levels along Mission sidewalks.

CMU Students after presenting at the City Commission Chambers on December 13, 2023

This class project was designed in partnership with the City's Department of Planning and Community Development and the Engineering Department.

DEVELOPMENT ACTIVITY

The year of 2023 was market with the largest number of special use and site plan review applications when compared to the previous five years:

- Special Use Permits: there were nine marihuana establishments that applied for an SUP (Special Use Permit), plus three short-term rentals, and one of each of the following: transitional housing, registered student organization, duplex, drive-through establishment, class I restaurant and bar/axe-throwing/catering.
- Site Plan Reviews: there were two new construction approvals for multiple-family dwellings in Downtown (affordable housing projects through the Payment in Lieu of Taxes Policy); and several improvements and alterations to existing facilities: seven for marihuana establishments, two for multiple-family dwellings and manufacturers, and one for each of the following uses: wholesale distributor, warehouse, oil and propane supplier, auto repair shop, construction establishment, grocery store, drive-through restaurant, class I restaurant, duplex, senior housing, and transitional housing.

Highlights

The year 2023 was a success as it relates to housing development, as projects cut across a variety of housing needs in the community: from the approval of missing middle typologies to affordable and transitional housing projects.

The first one is the February 2023 approval of the reconstruction of a duplex at 1006 Bruce Street by McGuire Family Investments, LLC, after the existing building caught on fire on November 1, 2022. As mentioned in the Master Plan, the City needs to better enable the construction and retrofit of structures that accommodate a greater diversity of housing units: from accessory dwellings at the back of properties, to duplexes and three- or four-unit apartment buildings.

1006 Bruce Street viewed from the alleyway looking southwest towards Bruce Street (February 2023).

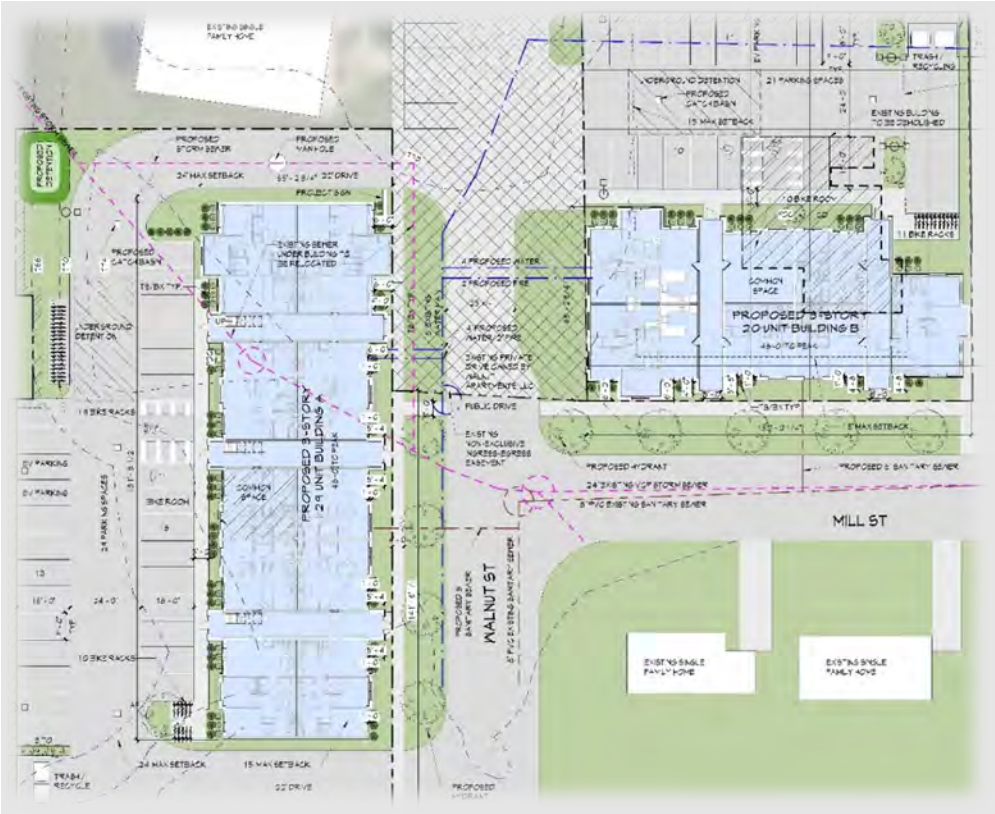
The proposed duplex will comprise of two two-bedroom units in a mirrored floor plan configuration, each one containing 1,159 square feet distributed within two stories.

Each unit will have a one-car enclosed garage accessed from the alley east of the property.

In September of 2023, the Planning Commission approved two apartment buildings (SPR-23-20 and SPR-23-21), located at 200 Walnut Street and 410 Mill Street. Offering 49 low-income housing units, these buildings would feature a mix of one to three-bedroom apartments, available to individuals that earn between 30 and 80% of the average median income (AMI) level, which for a one-person household, is between $15,900 and $42,400 annually. That means that estimated rents as of July 2023, depending on a resident's income, could range from $245-$850 for 1-bedroom units, $290-$950 for 2-bedroom units, and $330-$1,050 for 3-bedroom units.

Such affordability level is possible due to the Payment in Lieu of Taxes (PILOT) policy that the City Commission approved in December of 2022, which is authorized under the Michigan State Housing Development Authority (MSHDA) Act of 1966. A PILOT is an effective financial incentive related to low-income housing construction, allowing owners to pay a defined percentage of net shelter rent (or total owner revenue) instead of the local property tax rate.

Following up on such approved Policy, the City Commission decided to proceed with an initial trial period and release a Request for Affordable Housing Development Proposal in Q2 of 2023. Spire Development was the chosen applicant for the two projects in Downtown Mt Pleasant. Planning staff therefore negotiated a PILOT Ordinance established at 4% of the Annual Shelter Rent, to be distributed to all of the taxing entities similar to the way normal property tax distributions are handled, and a Municipal Service Agreement included an additional 4% of Annual Shelter rents, to be solely captured by the City to cover emergency services, as directed by the City Commission.



Proposed Site Plan

Building A - East Elevation

The proposed buildings will be built to LEED zero energy or equivalent energy efficiency standards. Landscaping will be provided around the building's foundations and street trees will be planted along the public frontages. Vehicular parking spaces will be provided for each unit behind the building, as well as EV (Electric Vehicle) parking stations, accessible stalls, and bicycle parking. Construction is scheduled to begin in Q3 of 2024, if project financing is approved by MSHDA in Q2 of 2024.

The year ended with the application for a transitional housing project (SUP-23-17 & SPR-23-24) by the Isabella County Restoration House (ICRH). ICRH is working towards relocating their facility currently located within the “Michigan Building” at 120 S Pine Street to 555 N Main Street. Planning Commission approval happened at the January meeting in 2024.

555 N Main Street viewed from the site, looking north (December 2023)

The beautiful three-story structure with over 7,600 square feet will not only be able to accommodate ICRH’s daily operations, but it will enable them to eventually open a year-round overnight shelter at the top floor for up to 45 occupants.

ICRH has provided testimony at previous Planning and City Commission meetings highlighting the great housing need in the Mt Pleasant community, with approximately 150 families needing to be sheltered. The facility will function as an emergency shelter for homeless individuals and families and will also provide support services so they can become self-sufficient and move into permanent housing in the community. Those services include connecting guests with counseling, assisting them with finding employment, providing referrals to housing options and case management services.

In the commercial category, it is always good to see applications that encourage a variety of uses within the same property, achieving one of the main sustainable land use goals laid out within the City’s Master Plan. As such, JCB Entertainment, LLC secured approval by the Planning Commission (SUP-23-09) in July of 2023 for an axe throwing and cornhole entertainment venue, that would also include a bar, a food production, and a catering business.

Valhalla owner and staff and the Chamber of Commerce at the official grand opening. (Source: The Morning Sun)

The proposed uses will occupy 7,600 square feet located at 1711 S Mission, with the existing large kitchen being shared by two local business owners that had been seeking a space to provide catering services and expand a tortilla chips & salsa small business.

2023 was another active year for the marihuana industry. Two existing businesses – SUP-23-01 for Rio's Happy Tree, LLC at 1012 N Lansing Street and SUP-23-06 for Stash Ventures, LLC at 212 W Pickard Street – have added a retail license onto their business model and retrofitted existing sites and structures to accommodate the change. Several other adult-use marihuana retailers will also be improving vacant properties and structures within the City such as Accelerate Green, Inc., Pure Releaf N Union, LLC, and Compassionate Advisors, LLC, which will be opening shop at 317 and 319 N Mission, and 2207 S Mission Street, respectively.

212 W Pickard Street viewed from the parking lot looking north (January 2024).

317 N Mission Street viewed from the parking lot, looking north (March 2023).

317 N Mission Street viewed from E Lincoln Street looking southwest (December 2023).

2207 S Mission Street viewed from Mission Street, looking north (May 2023).

Approved as-of-right, the renovation of Arby's at 1224 S Mission Street brings a fresh façade look and an elegant and compliant Band Sign along each of the two frontages.

1224 S Mission Street, viewed from E Preston Street looking northwest (Google Maps 2019)

1224 S Mission Street after renovations, viewed from E Preston Street looking northwest (January 2024)

Aside from physical improvements to buildings and sites, certain applications highlight the importance of operational standards located within the zoning ordinance. Culver's located at 1021 E Pickard Street had SUP-23-13 and SPR-23-18 approved to bring the existing drive-through into compliance with current regulations, increasing the stacking lane to provide over the required 200 feet. Parking lot and landscape enhancements will also contribute to the site's design improving upon its aesthetics and on-site traffic flow.

COMMUNITY IMPROVEMENT AWARDS

Since 1979, the Planning Commission has presented Community Improvement Awards annually to recognize projects for their outstanding contributions to improving our community. For 2023, the following properties were recognized.

Residential Award
111 Russel Street
Owner: Charles & Leigh Crespy

Residential Alteration (Built a new studio at the back of the property)

Residential Award
207 North Fancher
Owner: Hunter Campbell

Residential Alteration (House was gutted and restored with new electrical, plumbing, HVAC, drywall, roof, siding, doors, and window)

Commercial Award
502 N Mission Street
Owner: 502 N Mission, LLC
"The Woods" Marihuana Retailer

Commercial alteration (Interior renovation & exterior work)

MASTER PLAN IMPLEMENTATION

Mt. Pleasant 2050 – the City of Mt. Pleasant's Master Plan adopted in November 2020 – includes an Action Plan in book 5 which outlines specific goals and objectives for implementation of the plan. A list of those objectives, and progress to date, is included below.

	OBJECTIVE	PROGRESS
GOAL 1: Strive to ensure viable land uses that secure neighborhoods, enhance parks, and encourage vital businesses through sensible infill, complementary services, and targeted preservation.		
1.1	Encourage redevelopment that locates people within walkable and bikeable distances from essential services, jobs, and recreation. » Refer to Future Land Use Map during site plan review. » Continue to provide preliminary application meetings to developers. » Update housing market study periodically to maintain current perspective on housing needs.	The future land use map is referenced in all site plan reviews. Staff continues to hold pre-application meetings with interested developers prior to application to the Planning Commission or Zoning Board of Appeals.
1.2	Encouraged mixed uses and neighborhoods-scale business development to serve residential areas and complement Mission Street and Downtown. » Consider flexible business guidelines including home occupation rules for residential neighborhoods.	Conducted outreach known as "Zoning for Economic Opportunity" in Q1 of 2023. Discussed over thirteen zoning topics during Planning Commission work sessions in 2023. Target text introductions and public hearings to lift zoning barriers to encourage infill development, redevelopment and business expansion are being targeted to Q2/Q3 of 2024. The city was approved for a $50,000 MSHDA Housing Readiness Grant to advance housing-related items, including home occupation rules. That work is targeted to 2025-2027.
1.3	Require new structures to harmonize with architectural precedents of highly valued historical structures and landmarks.	No update.
1.4	Preserve neighborhood character through property maintenance requirements and code enforcement. » Pursue adoption of a property maintenance code for all residential properties in the City.	Property maintenance requirements (IPMC) were approved by the City Commission on August 14, 2023.

	» Periodically reevaluate code enforcement staffing levels to determine if those levels are sufficient to provide the level of service expected by the community. » Continue to utilize the Neighborhood Resource Unit to identify and prioritize neighborhood preservation and support activities.	Staff continued to implement the Neighborhood Enhancement Program grant to help with owner-occupied exterior home improvements. The City was able to secure a higher amount ($75,000) from MSHDA with a City contribution of an additional $80,000.
1.5	Improve landscape aesthetics and entryways within neighborhoods and business areas. » Consider a pilot program to fund neighborhood identity signage and neighborhood beautification. » Establish an annual tree planting goal. » Implement a tree planting program for commercial corridors and gateways. » Increase compliance of private landscaping with approved site plans.	The DDA three-year grounds keeping contract expired in 2023. However, on August 8, 2023, Green Scene Landscaping Inc. won a 3-year competitive bid process to provide these maintenance services to the DDA. Continue to inspect all sites prior to Certificate of Occupancy for landscape compliance.
1.6	Incentivize investment that addresses non-conforming land uses and blighted properties consistent with City codes and Zoning Ordinance. » Implement an incentive program which targets the conversion of non-conforming rooming dwellings in residential areas into conforming residential uses. » Explore establishment of a Neighborhood Enterprise Zone(s) to encourage neighborhood revitalization, owner occupied housing, and stimulate new investment. » Evaluate existing standards for improvement of nonconforming properties and determine if additional improvement opportunities should be permitted.	Staff updated the City Commission with new housing data that shows the current owner-occupancy vs. rental-occupancy rates (based on the number of properties as opposed to number of units within the City). This new analysis allowed for the dataset to not be skewed by student rentals within large apartment complexes. The City Commission is interested in Neighborhood Enterprise Zones in small, targeted areas to focus on the improvement of the building stock and the creation of missing middle housing typologies (as opposed to using the tool to incentivize the conversion of rentals into owner-occupied housing). Target Q2/Q3 of 2024 for a block-level property analysis to find potential NEZ target areas.
1.7	Encourage greater variety and mix of housing types within neighborhoods that provide opportunities for assisted living, downsizing, families, students, and first-time homebuyers. » Eliminate existing district density requirements to permit more missing-middle housing types to be developed citywide. » Reconsider the City's prohibition on PILOTs (payment in lieu of taxes). » Permit overnight on-street parking on City streets.	The City Commission adopted a PILOT Policy (payment in lieu of taxes) in Q4 of 2022 and selected one affordable housing project in 2023, which consists of two buildings in Downtown that will add 49 low income housing units, ranging between 30 to 80% AMI (average median income) and a mix of one- two- and three-bedroom apartments. Pending State approval from Low-Income Housing Tax Credit (LIHTC), with a resolution expected to occur in Q2 of 2024. Overnight parking continues to be permitted on City streets. However, the City approved the transition from the "even/odd" overnight parking system to one that aligns more closely with the existing snow emergency protocol, driven by the dual aim of operational efficiency and enhancing resident convenience by simplifying the process for residents, requiring them to relocate their vehicles only as needed rather than every evening.
1.8	Enable adaptive reuse of structure to preserve historic buildings, particularly within the Downtown. Require new structures to be of similar quality and designed to be easily used for multiple purposes.	Consistent with standards within the current zoning ordinance.
GOAL 2: Encourage smart, inviting, and attractive streets through infrastructure and operational investments that link people to places by walking, biking, driving and transit.		
2.1	Support neighborhood traffic calming measures to ensure safety and improve right-of-way aesthetics. » Ensure that all local street reconstruction projects are designed for a target speed of 25 MPH. » Pursue funding to implement a neighborhood traffic calming program. » Utilize the Traffic Control Committee to identify potential traffic calming interventions. » Continue to utilize the traffic count program to annually evaluate traffic volume and speed on local streets. » Adopt standards for traffic calming measures on City streets.	The pilot program to utilize radar speed signs to increase awareness of speeding and compliance with speed limits was tested in 2022 at two locations on W. Broadway and E. Preston. Unfortunately, there were no changes in speed. The City relocated the speed signs into two other locations, Watson and Crapo streets, to test the technology in 2023. Results will be reviewed again in 2024 after being in place for one year.
2.2	Maintain the roadway network and consistently evaluate system operations to ensure service objectives are met for all modes.	PASER data was collected for all roadways and sidewalks in 2023 informing maintenance and capital projects, such as road and sidewalks.

		Two road reconstruction projects were completed, Palmer: Main to University and Gaylord: Washington to University. Approximately $550k in thin asphalt overlay projects were completed on various major and local streets and Mission DDA alleys in the city.
2.3	Partner with MDOT and CMU to reimagine Mission Street as a vital business district and front door to the community and university. » Establish quarterly meetings with MDOT and CMU to monitor project implementation. » Work with MDOT and CMU to scope a traffic feasibility analysis that prioritized pedestrian travel in all alternatives evaluated. » Identify funding strategy and design approval procedures and timeline for completing construction documents.	Quarterly meetings with MDOT and CMU began in 2021 and are ongoing. MDOT conducted a modeling study for South of Mission Street in Q3 of 2023 and tested a narrow Boulevard option (with Michigan lefts and no on-street parking), to better fit within the right-of-way and not reroute traffic, while increasing multimodal services along the corridor. The City released a Request for Qualifications (RFQ) for a consultant to develop a Mission Street Corridor Plan as a Master Plan Update in coordination with MDOT, CMU and the Planning Commission and Downtown Development Authority (DDA) Board, to develop an implementable alternative with a phased approach that identifies funding opportunities, and near- to long-term solutions. 75% of the plan will be paid for by the Michigan Economic Development Corporation (MEDC) and 25% of the plan will be paid for by the DDA. The DDA continues to enable $60,000 to assist with the cost of closing and combining driveways within private properties along Mission Street in compliance with MDOT's Access Management Plan.
2.4	Retrofit the roadway network to provide safe accommodations for pedestrians and bicyclists. » Continue to consider bicycle and pedestrian accommodations in the design of all resurfacing and restriping projects as required by the City Complete Streets Ordinance » Explore collaborating with other local units of government to update the Mt. Pleasant Area Non-Motorized Transportation Plan. » Continue to require sidewalk installation where gaps exist in the network.	New sidewalk was constructed on the south side of Burch from Bradley to Adams. Commercial Districts are required to build sidewalks when projects come forward to the Planning Commission for approval if gaps exist. Each year the city budgets $150k to replace sidewalk and mudjack heaved sidewalk based on conditions and complaint locations. To promote safety during the winter months, owners and/or occupants are not required to clear any accumulations of ice and/or snow from public sidewalks adjoining such property within 24 hours.
2.5	Improve wayfinding between neighborhoods, districts, and parks in and around the City. » Develop a Mt. Pleasant area wayfinding plan. » Consider use of the MUTCD approved bicycle route signage.	The Parks Department is working on a wayfinding plan and maps for the city's trails.
2.6	Expand public transit opportunities in the City and implement innovative mobility policies to improve choice and access for system users. » Work with I-Ride to increase transit service in the community. » Work with I-Ride to develop bus stop standards that are compatible with the City's complete streets ordinance.	No update.
2.7	Ensure that the Mt. Pleasant Municipal Airport continues to be utilized as a regional nexus, and link to the local transportation system. » Continue to partner with local units of government and businesses to financially support airport operations.	Formed a Joint Operations Board with Isabella County, Saginaw Chippewa Indian Tribe, Union Township, and Middle Michigan Development Corporation. Meetings are held monthly. Annual financial support is received by the partnering agencies. SCIT continues to offer support through the 2% grant program.
2.8	Continue to evaluate parking assets and requirements to make sure that current and future technologies and travel patterns are encouraging the highest and best use of land. » Consider developing a parking management plan and continually updating it based upon current best practices.	No update.
GOAL 3: Activate the City's most underutilized sites to realize the value of nearby public and private assets through adaptable, durable, and future facing structures and landscapes.		
3.1	Promote economic vitality that is consistent with the City's form-based code and aesthetic values.	RRC (Redevelopment Ready Community) Recertification activities were successfully concluded in Q1 2024. As part of that process, the City has created new Downtown and

	» Consider participation in national conferences like NCSC to market the Mission corridor to potential developers. » Work with DDA to identify and develop a beautification strategy for the corridor and community gateways. » Continue to evaluate utility and infrastructure needs for future construction projects. » Maintain certification as a Redevelopment Ready Community.	Marketing Plans, a new website that is more user friendly and contains all the information required by RRC, and has updated the Economic Development, Public Participation and Boards/Commissions Training Plans. The City also continues to offer pre-application meetings and the Citizen's Academy, and adopts the Capital Improvement Plan on an annual-basis. Zoning text amendments are on-going and seek the removal of unnecessary obstacles and alignment with the Master Plan.
3.2	Improve multimodal accessibility along and across major corridors. » Incorporate a dedicated pedestrian signal phase at every signalized intersection. » Evaluate opportunities to reduce crossing distances including installation of pedestrian refuge islands and beacons. » Install enhanced pedestrian signs and markings at existing and planned pedestrian crossing.	MDOT conducted a modeling study for South of Mission Street in Q3 of 2023 and tested a narrow Boulevard option (with Michigan lefts and no on-street parking), to better fit within the right-of-way and not reroute traffic, while increasing multimodal services along the corridor. Analysis showed no negative impacts on traffic flow and traffic count. This work on Mission Street can assist the City in considering similar design options for other corridors.
3.3	Promote a compatible relationship between commercial developments and adjacent land uses. » Enforce buffer standards through site development procedures. » Evaluate special use standards to ensure that those with light, noise, odor, or other adverse impacts are appropriately regulated to minimize impact.	Consistent with standards within the current zoning ordinance.
3.4	Continue to identify site development priorities and work to foster public private partnerships to create new places in the City. » Develop a strategy to market property at the former Mt. Pleasant Center for taxable development. » Continue to partner with the Michigan Economic Development Corporation to facilitate the redevelopment of priority sites.	Planning and future marketing of the Mt. Pleasant Center is currently on hold until deed language has been clarified through legislative action. Priority redevelopment site flyers and lists are maintained quarterly and advertised on the City's website.
3.5	Promote culturally sensitive, responsible, sustainable, and accessible site design throughout the City.	Consistent with standards within the current zoning ordinance.
3.6	Promote a vital mix of businesses and uses within the Downtown, including uses that have flexible hours of operation, provide entertainment, and events.	Staff conducts year-round promotion of businesses, activities and hours of operation via social media and radio.
3.7	Improve pedestrian access and walkability within the Downtown and the connections to surrounding neighborhoods and parks. » Develop a plan for the replacement of the Downtown streetscape. » Explore the feasibility of provided a more direct pedestrian connection between downtown and Island Park. » Continue to evaluate opportunities to improve pedestrian lighting between neighborhoods and Downtown.	The City has continued to repair lighting throughout downtown as needed due to the aged infrastructure. Lighting upgrades will be a part of the Town Center Civic Space project in 2024.
3.8	Encourage incremental new development projects in outlying neighborhoods on the North, West, and East that are compatible with walkable neighborhoods form.	The Planning Commission is in support of a large rezoning at the southwest corner of Broomfield and Crawford, which would dismantle the existing Planned Residential Development (PRD) Agreement and map existing zoning districts, making future projects more predictable. This rezoning will also help facilitate the construction of a new private school in the area.
GOAL 4: Build the value of the City's expansive park system beyond site borders to achieve synergy between ecological environments and programmed spaces while elevating the systems appeal to residents and visitors.		
4.1	Continue to develop facilities that serve Mt. Pleasant families and provide activities for all stages of life.	Added a community garden and pickleball courts to Horizon Park in 2023. Added pickleball lines on the tennis courts in Island Park in 2023.
4.2	Develop a City-wide bike/hike/path system that connects parks to neighborhoods, CMU, Downtown, Mission Street, and regional pathways.	Engineering and Design of the GKB/Mid-Michigan Pathway North Connections was completed in 2024 and construction is scheduled to occur in 2025.
4.3	Improve pedestrian and bicycle access within the park system and provide recreation opportunities that are oriented towards non-motorized park access.	Design of the GKB/Mid-Michigan Pathway South Connections was completed in 2023. The project is on the CIP schedule for 2027.
4.4	Continue and enhance park development, improvements, and maintenance.	A Parks Maintenance Plan was completed in 2024.
4.5	Continue, expand and improve recreation programs.	Looking at introducing an archery program in 2024.

4.6	Develop recreation-based partnerships with County, townships, CMU, schools, and the tribe.	Currently looking for new partners to enhance our outdoor programming.
4.7	Improve and support river access and stewardship.	Developing an Invasive Species Plan is scheduled for 2024.
4.8	Provide expanded recreation opportunities to residents that live east of Mission Street through development of new parkland.	Added a community garden and Pickleball Courts to Horizon Park.
4.9	Market City parks and recreation facilities to new and existing City residents to foster greater awareness.	No update.
GOAL 5: Foster collaboration in attaining a safe, healthy, fiscally solvent, and accessible City that is reflective of community culture, proactive to community preferences, and equitable in community resources.		
5.1	Increase tourism and marketing of the City to draw more people to the Downtown. » Consider establishing an annual marketing budget to be managed by the Downtown Development Director.	General funds for marketing was reduced in 2023 to cover website maintenance and social media efforts.
5.2	Enhance and improve employment opportunities and training for higher paying/non-service sector jobs. » Continuing to partner with Middle Michigan Development Corporation to retain and attract employers to the region. » Continue to collaborate with Central Michigan University on the development of University Park.	Staff of the City, Middle Michigan Development Corporation (MMDC), and Central Michigan University Research Corporation meet monthly to discuss strategies for attracting development to the Smart Zone. City, MMDC, and Michigan Economic Development Corporation staff conduct retention calls with local manufacturers.
5.3	Encourage greater community involvement and coordination with public safety to help identify community issues, reduce crime, and increase safety. » Utilize the Neighborhood Resource Unit to promote the creation of neighborhood groups and associations. » Continue to maintain police visibility at public venues and events to provide opportunities for interactions between officers and members of the public.	No update.
5.4	Increase cooperation and coordination between government and other organizations.	This effort will be continued every year as relationship building requires constant effort. The City continues to participate in regular meetings with county, CMU, tribal, and non-profit partners.
5.5	Improve neighborhood services and encourage creation of neighborhood organizations, particularly to strengthen the relationship between the City, local neighborhoods, CMU, and its students.	No update.
5.6	Improve environmental services and regulations in City, particularly recycling opportunities. » Consider the formation of a climate change task force and development of a climate change action plan. » Continue to expand the type of materials accepted by the City recycling program. » Evaluate City operations to identify opportunities reduce environmental impact.	The Water Resource Recovery staff partnered with CMU to pilot receiving food waste into the anaerobic digesters. Through the success of the pilot study, plans to construct a food waste receiving station became feasible. The WRRF (Water Resource Recovery Facility) team participated in a Next Cycle I2P3 challenge track through which $500,000 in funding from EGLE (Environment, Great Lakes, and Energy) was pledged to move forward with the project. This, along with a $300,000 grant from the Saginaw Chippewa Indian Tribe, will allow the Food Waste Receiving Station to be construction at the end Phase 2 of the WRRF Plant Upgrade.
5.7	Continue to develop public facilities to serve the needs of City residents and visitors. » Develop a plan for the creation of an improved civic space at Town Center.	The City was awarded a $1 million grant through the MEDC's Revitalization and Placemaking Grant (RAP) program, helping support the almost $2.3 million town center project. Such project was developed in-house by the Downtown, Engineering, Parks and Recreation, and Planning Departments and will include a universal accessible design with public restroom and a larger green space to better accommodate public gatherings, events, and recreational activities. Additional parking spaces, including electrical vehicle charging stations, will help support local businesses. Construction is expected to begin in Q2 of 2024.

Minutes of the regular meeting of the City Commission held Monday, March 11, 2024, at 7:00 p.m., in the City Commission Room, 320 W. Broadway St., Mt. Pleasant, Michigan with virtual options.

Clerk Bouck called the meeting to order.

The Pledge of Allegiance was recited.

Land Acknowledgement statement was recited.

Commissioners Present: Liz Busch; Brian Chapman, Maureen Eke, Grace Rollins & Boomer Wingard

Commissioners Absent: Mary Alsager and Amy Perschbacher

Others Present: City Manager Aaron Desentz and City Clerk Heather Bouck

Moved by Commissioner Busch and seconded by Commissioner Wingard to nominate Maureen Eke as the Chairperson for the meeting. Motion unanimously adopted.

Moved by Commissioner Wingard and seconded by Commissioner Busch to approve the Agenda as presented. Motion unanimously adopted.

Public Input on Agenda Items:

Receipt of Petitions and Communications

Received the following petitions and communications:

1. Monthly report on police related citizen complaints received.

Moved by Commissioner Busch and seconded by Commissioner Rollins to approve the following items on the Consent Calendar:

2. Minutes of the regular meeting of the City Commission held February 26, 2024.
3. Receive City requests for Saginaw Chippewa Indian Tribe 2% allocations.
4. Warrants and payrolls dated March 7, 2024 all totaling $127,442.75.

Motion unanimously adopted.

Moved by Commissioner Wingard and seconded by Commissioner Busch to adopt a Michigan Department of Transportation resolution authorizing the approval of the contract for the Taxiway A Rehabilitation and Taxiway Lighting Construction Projects. Motion unanimously adopted.

Moved by Commissioner Wingard and seconded by Commissioner Busch to approve contract with Mead & Hunt in the amount of $277,258 for engineering and project management services for the Taxiway A Project. Motion unanimously adopted.

Moved by Commissioner Wingard and seconded by Commissioner Rollins to approve contract with Crawford Contracting of Mt. Pleasant, Michigan in the amount of $2,712,410 for the Rehabilitation of Taxiway A at the Mt. Pleasant Municipal Airport. Motion unanimously adopted.

Announcements on City-Related Issues and New Business

Commissioner Busch announced that Mt. Pleasant High School presents Beauty and the Beast this weekend. Tickets are available on the school website.

Moved by Commissioner Chapman and seconded by Commissioner Busch to adjourn the meeting at 7:20 p.m. Motion unanimously adopted.

_____ _____

Maureen Eke, Chairperson Heather Bouck, City Clerk

Memorandum

Mt. Pleasant [meet here]

TO: Aaron Desentz
City Manager

FROM: Phil Biscorner
Director of Parks and Public Spaces

DATE: March 13, 2024

SUBJECT: 2024 MDNR Trust Fund Grant Application –
2025 Mid-Michigan/GKB Pathway North Connection Project

The Parks Department is preparing an application for a Michigan Department of Natural Resources (MDNR) "Michigan Natural Resources Trust Fund (MNRTF) Grant" for the proposed 2025 Mid-Michigan/GKB Pathway North Connection Project. The state requires applicants to hold a public hearing on their application and pass a resolution as part of the completed grant package.

The pursuit of grants continues to be a resource to help provide additional funds for park projects. Parks staff looks at upcoming projects and analyzes the best funding opportunities for our proposed projects.

All MDNR Grants carry an April 1 application deadline and awards are announced early the following year. Due to this year long grant cycle staff must select applicable projects planned for the 2025 construction season and apply now to be part of the approved applicant pool.

A major priority for the Trust Fund Grant program is trails. Extra points are given for trail projects which connect existing trail loops, multiple parks and regional connections, all of which apply to the project. The application proposes to use the City's $125,000 budget with $375,000 from Union Township and $400,000 from Michigan Department of Transportation "Transportation Alternatives Program (TAP) Grant" as match for the $400,000 MNRTF Grant request for a total project cost of $1,300,000.

At this time all that is needed is for the City Commission to adopt a resolution to apply for grant funding for the Mid-Michigan/GKB Pathway North Connection Project. This project will proceed in 2025 regardless of whether the City is awarded these funds or not.

REQUESTED ACTION
The City Commission adopt the attached resolution.

City of Mt. Pleasant
Michigan Department of Natural Resources
2024 Michigan Natural Resources Trust Fund Grant Application
Resolution of Adoption

Whereas, the City of Mt. Pleasant, in cooperation with the Isabella County Friends of the Mid-Michigan Regional Community Pathways Group and the Charter Township of Union, wishes to construct a trail connecting the GKB Riverwalk Trail to Mission Creek Park and to establish a northerly connection point for the Mid-Michigan Regional Pathway System, and

Whereas, the proposed project is consistent with the Greater Mt. Pleasant Non-Motorized Plan and provides a vital connection for City and Township residents to access the City's park system and existing 4 miles of paved, non-motorized pathways, and

Whereas, the proposed project is specifically outlined in and consistent with the goals and objectives of the City's current 2023-2028 Parks and Recreation Master Plan, and

Whereas, the proposed project is listed in the City's adopted 2024-2029 Capital Improvement Plan, and

Whereas, the proposed project and grant application were discussed at a public meeting of the Mt. Pleasant City Commission held March 28, 2022 at 7:00 p.m. at Mt. Pleasant City Hall to provide an opportunity for additional public comment on the proposed project, and

Whereas, the City of Mt. Pleasant has committed to providing $125,000 or 10% of the total $1,300,000 project cost from City matching funds along with $375,000 or 28% of the total $1,300,000 project cost from Township matching funds along with $400,000 or 31% of the total $1,300,000 project cost from Michigan Department of Transportation “Transportation Alternatives Program (TAP) Grant”;

Be it therefore resolved that the Mt. Pleasant City Commission hereby approves submittal of a 2024 Michigan Department of Natural Resources Trust Fund Grant application for the Mid-Michigan/GKB Trail Project.

Yeas:
Nays:
Absent:

I, Heather Bouck, City Clerk, do hereby certify that the foregoing is a true and original copy of a resolution adopted by the City of Mt. Pleasant at a Regular Meeting thereof held the 25th day of March, 2024.

_____City Clerk
Heather Bouck

CITY SEAL HERE

CHECK DATE FROM 03/08/2024 - 03/21/2024

Check Date	Vendor Name	Description	Amount
Bank COMM COMMON CASH			
03/08/2024	DTE ENERGY	UTILITIES	11,848.84
03/15/2024	CITY TREASURER - UTILITIES	UTILITIES	3,958.73
03/15/2024	ISABELLA BANK	BOND PAYMENT	113,223.75
03/15/2024	MICHIGAN FINANCE AUTHORITY/SRF	BOND PAYMENT	421.88
03/21/2024	CHRISTINE WITMER	REIMBURSEMENT	50.00
03/21/2024	JANENE CHISEK	REIMBURSEMENT	26.13
03/21/2024	MICHELLE SPONSELLER	REIMBURSEMENT	93.80
03/21/2024	21ST CENTURY MEDIA	CONTRACT SVCS	1,235.00
03/21/2024	21ST CENTURY MEDIA	CONTRACT SVCS	891.61
03/21/2024	ABC FASTENER GROUP, INC	SUPPLIES	370.82
03/21/2024	ACME SPORTS INC	SUPPLIES	435.00
03/21/2024	AIRGAS USA, LLC	CONTRACT SVCS	69.76
03/21/2024	AL FOOR, JR STATEWIDE DIST.	SUPPLIES	216.00
03/21/2024	ALMA TIRE SERVICE INC	CONTRACT SVCS	2,525.30
03/21/2024	AUSTIN PAHL	REIMBURSEMENT	82.00
03/21/2024	AXIOM WIRING SERVICE, LLC	CONTRACT SVCS	300.00
03/21/2024	AXON ENTERPRISE, INC.	CAPITAL OUTLAY	25,219.60
03/21/2024	BIO-CARE, INC	CONTRACTED SVCS	5,401.75
03/21/2024	BOUND TREE MEDICAL, LLC	SUPPLIES	182.25
03/21/2024	BROCK BINDER	CONTRACT SVCS	30.00
03/21/2024	BSN SPORTS LLC	SUPPLIES	6,300.00
03/21/2024	BUSINESS CONNECTIONS, INC.	CONTRACT SVCS	117.49
03/21/2024	CAROL MOODY	REIMBURSEMENT	455.74
03/21/2024	CDW GOVERNMENT, INC	SUPPLIES	761.45
03/21/2024	CENTRAL MICHIGAN UNIVERSITY	SUPPLIES	750.00
03/21/2024	CENTURYLINK	COMMUNICATIONS	11.59
03/21/2024	CINTAS CORP	SUPPLIES	163.08
03/21/2024	CINTAS CORP	SUPPLIES	85.92
03/21/2024	COYNE OIL CORPORATION	FUEL	1,537.58
03/21/2024	CUMMINS SALES AND SERVICE	CONTRACT SVCS	1,767.15
03/21/2024	DELTA COLLEGE	TRAINING	9,682.00
03/21/2024	ELECTIONSOURCE	CONTRACT SVCS	7,208.00
03/21/2024	ERIN ZIMMER	TRAINING	181.00
03/21/2024	FERGUSON ENTERPRISES, LLC &	SUPPLIES	2,430.90
03/21/2024	FISHBECK - ENGINEERS/ARCHITECTS/	CONTRACTED SVCS	7,103.60
03/21/2024	FLEX ADMINISTRATORS	CONTRACTED SVCS	231.00
03/21/2024	GRAINGER	SUPPLIES	104.77
03/21/2024	GRAYMONT WESTERN LIME INC.	CHEMICALS	8,088.08

03/21/2024	GREAT LAKES CONCRETE RESTORATION	CONTRACTED SVCS	23,750.00
03/21/2024	HYDROCORP, INC.	CONTRACTED SVCS	4,829.50
03/21/2024	INFOSEND, INC	CONTRACTED SVCS	117.13
03/21/2024	JUSTIN NAU	REIMBURSEMENT	268.93
03/21/2024	KEEP MICHIGAN BEAUTIFUL, INC.	CONTRACTED SVCS	40.00
03/21/2024	KRAPOHL FORD LINCOLN MERC	CONTRACTED SVCS	191.35
03/21/2024	LILLY PIERCE	CONTRACT SVCS	30.00
03/21/2024	LOGOS GALORE/MORDICA SALES	UNIFORMS	90.00
03/21/2024	MAMC	MEMBERSHIP	45.00
03/21/2024	MANNIK SMITH GROUP	CONTRACT SVCS	7,754.65
03/21/2024	MCLAREN CORPORATE SERVICES	CONTRACT SVCS	207.00
03/21/2024	MELISSA WANINK	CONTRACT SVCS	30.00
03/21/2024	METRON-FARNIER, LLC	SUPPLIES	16,353.66
03/21/2024	MICHIGAN PIPE & VALVE	SUPPLIES	1,905.00
03/21/2024	MICHIGAN TACTICAL OFFICERS ASSOC	TRAINING	250.00
03/21/2024	MID MICHIGAN AREA CABLE	CONTRACT SVCS	450.00
03/21/2024	MID MICHIGAN INDUSTRIAL COATINGS	CONTRACT SVCS	4,311.44
03/21/2024	MID-MICHIGAN INDUSTRIES	CONTRACT SVCS	9,952.64
03/21/2024	MISSION COMMUNICATIONS, LLC	CONTRACT SVCS	4,421.40
03/21/2024	MMTA	TRAINING	599.00
03/21/2024	MOTOROLA SOLUTIONS, INC.	COMMUNICATIONS	958.50
03/21/2024	MP AREA CHAMBER OF COMMERCE	TRAINING	75.00
03/21/2024	MUNICIPAL SUPPLY CO.	SUPPLIES	1,923.24
03/21/2024	NYE UNIFORM COMPANY	UNIFORMS	412.48
03/21/2024	ODP BUSINESS SOLUTIONS LLC	SUPPLIES	301.94
03/21/2024	OHM ADVISORS	CONTRACT SVCS	2,474.50
03/21/2024	ON DUTY GEAR, LLC	UNIFORMS	337.00
03/21/2024	PARTLO PROPERTY MANAGEMENT LLC	CONTRACT SVCS	500.00
03/21/2024	PAT MCGUIRK EXCAVATING, INC	CONTRACT SVCS	725.00
03/21/2024	PAYTON VEILLEUX	CONTRACT SVCS	45.00
03/21/2024	PHOENIX SAFETY OUTFITTERS	UNIFORMS	1,681.25
03/21/2024	PREIN & NEWHOF	CONTRACT SVCS	265.00
03/21/2024	PRO COMM, INC	CONTRACT SVCS	490.00
03/21/2024	PURITY CYLINDER GASES INC	SUPPLIES	33.62
03/21/2024	RILEY OLSEN	CONTRACT SVCS	15.00
03/21/2024	SHERWIN INDUSTRIES, INC	SUPPLIES	15,750.00
03/21/2024	SOIL AND MATERIALS ENGINEERS, INC.	CONTRACT SVCS	1,900.00
03/21/2024	SPECTRUM PRINTERS, INC.	CONTRACT SVCS	344.00
03/21/2024	STATE OF MICHIGAN	CONTRACT SVCS	195.00
03/21/2024	STATE OF MICHIGAN	CONTRACT SVCS	625.00
03/21/2024	STERICYCLE, INC.	CONTRACT SVCS	307.30
03/21/2024	SUMMIT FIRE PROTECTION	CONTRACT SVCS	140.00
03/21/2024	T.H. EIFERT, LLC	CONTRACT SVCS	7,370.07
03/21/2024	TERRY'S CYCLE & SPORTS	SUPPLIES	1,746.49

03/21/2024	THE ROSSOW GROUP	TRAINING	195.00
03/21/2024	THOMAS HORGAN	CONTRACTED SVCS	500.00
03/21/2024	TRACE ANALYTICAL LABORATORIES, INC.	SUPPLIES	3,255.25
03/21/2024	UNIFIRST CORPORATION	CONTRACT SVCS	71.53
03/21/2024	USABLUEBOOK	SUPPLIES	4,302.00
03/21/2024	VDA LABS	CONTRACT SVCS	16,900.00
03/21/2024	WIELAND TRUCKS	SUPPLIES	960.97
03/21/2024	WSG ARCHITECT	CONTRACT SVCS	1,139.00

COMM TOTALS:	
Total of 90 Checks:	355,097.41
Less 0 Void Checks:	0.00
Total of 90 Disbursements:	355,097.41

Memorandum

Mt. Pleasant [meet here]

TO: Aaron Desentz
City Manager

FROM: Phil Biscorner
Director of Parks and Public Spaces

DATE: March 20, 2024

SUBJECT: 2024 Design and Engineering Services – GKB/Mid-Michigan Pathways North Connection

Request:
The City Commission is requested to authorize award of the contract for "2024 Design and Engineering Services – GKB/Mid-Michigan Pathway North Connection" to Fleis & Vanderbrink for a total price of $169,100. This project includes design and engineering services for the GKB/Mid-Michigan Pathway North Connection. This section of pathway will connect Nelson Park to Mission Creek Park.

Reason for Purchase:
This project was included in the 2024 CIP budget. As stated in the City Master Plan, there is a need to connect the City's trail system to both the northern and southern portion of the City. This project connects the City to the north. The southern section is proposed to be completed by 2027.

Process:
On March 19, 2024 bids were received through the City's competitive bid process. Funds for this project will come from the Capital Improvement millage.

Company Name	Address	Base Bid Amount	
Fleis & Vanderbrink	Midland, MI	$169,100	
Eng.	Lansing, MI	$170,220	

Staff is recommending award of the total bid to Fleis & Vanderbrink for a total price of $169,100 (low bidder) which is within the anticipated amount for the project. The City has worked with Fleis & Vanderbrink in the past and they have successfully completed work of similar scope so we have confidence in their ability to complete the project successfully.

Recommended Action:
Staff recommends the City Commission authorize the award of the total bid contract for the "2024 Design and Engineering Services – GKB/Mid-Michigan Pathway North Connection" to Fleis & Vanderbrink for a price of $169,100.

Memorandum

Mt. Pleasant
[meet here]

2024-2025 Proposed North Connection location Map

Proposed Pathway Connection 1 Mile

NORTH

Memorandum

Mt. Pleasant [meet here]

TO: Aaron Desentz
City Manager

FROM: Phil Biscorner
Director of Parks and Public Spaces

DATE: March 13, 2024

SUBJECT: Community Garden Update/Community Orchard Proposal

Community Garden Update:

In 2023, the Community Garden at Horizon Park included 15 raised beds constructed from cedar, which were all rented out to community members for a nominal cost of $30 annually. The City did not receive any requests to add additional spaces. There is still space to build new raised beds should we receive any further interest which would require more than the 15 spaces we currently have.

Proposal for the Establishment of Horizon Park Community Orchard:

Description:
Incorporating input from residents of the City of Mt. Pleasant, we propose the creation of a community orchard in Horizon Park. This orchard will serve as an educational tool, a source of locally produced fruit, and a gathering place for the community, aligning with the city's sustainability goals. The project aims to reduce environmental impact, enhance community resilience, and promote sustainable practices.

Benefits of the Community Orchard:

- Enhances the aesthetic appeal of the park and surrounding neighborhoods on the east side of Mt. Pleasant.
- Provides fresh, locally grown fruit for park visitors and encourages fruit tree cultivation in the community.
- Supports pollinator habitat, benefiting the local ecosystem and residents' gardens.
- Fosters community stewardship and volunteerism, promoting long-term care and sustainability.

Orchard Plan/Goals:
To establish a community orchard aimed at providing recreational opportunities and fostering community engagement. Focus on selecting low-maintenance fruit varieties like apples to ensure success and sustainability. The proposed orchard will feature varieties are selected for their ease of maintenance, resilience to pests and diseases, and successful cultivation in the area.

Proposed Location:
Incorporating the vision for Horizon Park, encompassing with amenities like pickleball courts, playground, and picnic areas, restroom/pavilion area provides an ideal setting for the orchard. The open area located behind the Community Garden offers opportunities for collaboration and volunteer recruitment.

Orchard Design:
Begin with a modest layout, considering no more than 6 fruit trees initially. Simple design to facilitate maintenance and community involvement.

Memorandum

Mt. Pleasant [meet here]

Commitment:
Incorporating a long-term commitment to ensure the orchard's health and productivity. Resident volunteers will be engaged in tasks such as watering, fertilizing, and pruning. Partnerships with local organizations and volunteer groups will further support ongoing maintenance efforts.
Project Timeline and Phases:

Immediate Phase:
Incorporating the planting and initial care of trees by City of Mt. Pleasant residents and volunteers. Organize volunteer events to prepare the site, including soil preparation and planting. Develop a maintenance plan with input from volunteers. Encourage youth participation through local schools, youth organizations, and community outreach initiatives. Empower volunteers to take ownership of orchard maintenance and management. Provide training and resources as needed.

First Year:
Incorporating tree planting and mulching, recruitment and training of resident volunteers, and regular watering and maintenance activities.

Second Year:
Incorporating the assessment of tree survival, replanting if necessary, continued watering, fertilization, mulching, pruning, and pest management strategies.

Long Term:
Incorporating continuous resident involvement for ongoing care, addressing hazards, invasive species, diseases, and vandalism, exploring organic pest management methods if needed, and allowing 3-5 years for trees to fully establish and bear fruit.

Evaluation and Reassessment:
Conduct periodic evaluations to assess orchard progress and community engagement. Adjust strategies and plans as necessary based on feedback and outcomes. Schedule a formal review after the first year of operation to reassess goals and plan for future development.

Conclusion:
The Horizon Park Community Orchard project represents a collaborative effort to create a sustainable and resilient community asset. Through active engagement and stewardship, City of Mt. Pleasant residents aim to incorporate environmental stewardship and enhance the quality of life for all. This proposal outlines a simple yet effective approach to establishing a community orchard, emphasizing community involvement and sustainability. By following these steps, we aim to create a valuable recreational asset for the community while fostering a sense of ownership and pride among volunteers.

SEMI-ANNUAL TWO PERCENT ALLOCATION

CITY OF MT. PLEASANT REQUESTS

SPRING 2024

DEPARTMENT/PROJECT NAME		AMOUNT	PRIORITY
Airport			
Airport Feasibility Study	$	50,000.00	H
Airport Operational Funding	$	80,000.00	C
Runway/Taxiway Rehab	$	50,000.00	C
Engineering			
1303 N Franklin Former Landfill Remediation & Monitoring	$	50,000.00	L
Sidewalk Replacement	$	150,000.00	L
Police			
Mt. Pleasant Police Vehicle and Body Camera Project	$	162,000.00	C
Public Works			
Sewer Pipline Inspection Camera	$	57,615.00	M
Streets			
Asphalt Overlays and Street Resurfacing	$	620,856.80	M
Pickard Storm Sewer	$	247,780.00	H
Total Requested	**$**	**1,468,251.80**	

Overview

Project Name
Airport Feasibility Study

Total Requested
$50,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
High

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
bbrickner@mt-pleasant.org

Applicant Email
Bill Brickner

Organization
Mt. Pleasant Airport

Address
5453 E. Airport Rd
Mt. Pleasant , 48858

Phone Number
9897722965

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Economic development
- Infrastructure
- Safety/Security
- Transportation

Project Description

This funding is for a feasibility study on possible future expansion of the Mt. Pleasant Municipal Airport. Stake holders will be involved in the study to develop a plan for the highest best use of the airport, services, and staffing.

Benefit Description

The airport is a driver for economic development and business growth. The Mt. Pleasant Airport is a major gateway to the Tribal community's casino and resort operations. The funding would help to plan future expansion of the airport including infrastructure, safety features, staffing and equipment needs.

Funding Requirements

The funding request is for $50,000 for the feasibility study.

Project Timeline

Spring 2024

Budget Items

Name	Cost	Quantity	Total	Category
Airport feasibility study	$50,000.00	1	$50,000.00	Transportation
AmountRequested	**$50,000.00**			

Matching Funds

Name	Cost	Quantity	Total
No Matching Funds items have been added.			
AmountMatched	**$0.00**		

Budget Summary

Amount Requested

$50,000.00

Amount Matched

$0.00

Total Amount

$50,000.00

Uploaded Files

Name
No files have been uploaded.

There are no comments to display.

Overview

Project Name
Airport Operational Funding

Total Requested
$80,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Critical

Reocurring Need?
This Request is Reocurring

Applicant Information

Applicant Name
bbrickner@mt-pleasant.org

Applicant Email
Bill Brickner

Organization
Mt. Pleasant Airport

Address
5453 E. Airport Rd
Mt. Pleasant , 48858

Phone Number
9897722965

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Project Partners

Partnered With
Union Township

Authorizers
Mark Stuhldreher mstuhldreher@uniontownshipmi.com

Status
Review

Address
2010 S Lincoln Road
Mount Pleasant, Michigan 48858

Phone
989-772-4600

Fax

989-773-1988

Partnered With
Isabella County

Authorizers
nfrost@isabellacounty.org

Status
Review

Address
200 N. Main Street
Mount Pleasant, Michigan 48858

Phone
989 772-0911

Fax

Categories

- Economic development
- Infrastructure
- Safety/Security
- Transportation

Project Description

This funding request is to provide funds to support basic operations of the airport. Appropriate staffing levels to cover operational needs have, in the past, been covered in part by using airport fund balance. Staffing at the airport ensures that appropriate staff is available 7 days per week to service aircraft.
In order to provide the necessary funds for basic operation of the Mt. Pleasant Municipal Airport, the City has had to contribute $81,600 per year from the general fund. The Saginaw Chippewa Tribe has provided funding for the airport operations on a regular basis. Without ongoing funding from the Tribal 2% allocations, the services at the airport could not be maintained.

Benefit Description

The airport is an economic driver for economic development and business growth. The Mt. Pleasant Airport is a major gateway to the Tribal community's casino and resort operations. Many entertainers appreciate the convenience and service they experience at the airport when coming to preform at the resort. The ability to provide essential service to the Tribal community's visitors and business associates may be affected without adequate funding. A recent study by MDOT indicated that the economic benefit to the surrounding area is $8 million per year.

Funding Requirements

A new partnership to share oversite and management with partners including Isabella County, Union Township, MMDC, and the Saginaw Chippewa Indian Tribe has recently been instituted. This partnership provides $17,000 annually towards the operation of the airport

Description of Reocurring Need

Project Timeline

Not Entered

Budget Items

Name	Cost	Quantity	Total	Category
Airport Operational Funding	$80,000.00	1	$80,000.00	Transportation

Name	Cost	Quantity	Total	Category
AmountRequested	**$80,000.00**			

Matching Funds

Name	Cost	Quantity	Total
Airport Fuel Revenue	$150,000.00	1	$150,000.00
Airport Rentals	$50,000.00	1	$50,000.00
Call outs	$14,000.00	1	$14,000.00
Contribution from general fund	$82,000.00	1	$82,000.00
AmountMatched	**$296,000.00**		

Budget Summary

Amount Requested

$80,000.00

Amount Matched

$296,000.00

Total Amount

$376,000.00

Uploaded Files

Name
No files have been uploaded.

There are no comments to display.

Overview

Project Name
Runway/Taxiway Rehab

Total Requested
$50,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Critical

Reocurring Need?
This Request is Reocurring

Applicant Information

Applicant Name
bbrickner@mt-pleasant.org

Applicant Email
Bill Brickner

Organization
Mt. Pleasant Airport

Address
5453 E. Airport Rd
Mt. Pleasant , 48858

Phone Number
9897722965

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Project Partners

Partnered With
Union Township

Authorizers
Mark Stuhldreher mstuhldreher@uniontownshipmi.com

Status
Review

Address
2010 S Lincoln Road
Mount Pleasant, Michigan 48858

Phone
989-772-4600

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989-773-1988

Partnered With
Isabella County

Authorizers
nfrost@isabellacounty.org

Status
Review

Address
200 N. Main Street
Mount Pleasant, Michigan 48858

Phone
989 772-0911

Fax

Categories

- Economic development
- Infrastructure
- Safety/Security
- Transportation

Project Description

This funding is to match the Federal and State funding provided to rehabilitate Taxiway "A" and Runway 9/27. In 2022, consultants began the design work for the Taxiway "A" rehabilitation. This project will include lighting, signage, runway re-designation, and repaving of Taxiway "A". It is anticipated the construction work will commence during the 2024 construction season. In 2024, it is anticipated the design work for Runway 9/27 would begin with construction taking place in 2025. Projected costs for these projects are $5,500,000 with Federal grants covering $4,950,000, and State grants covering $275,000, and required local share of $275,000. The lighting and pavement in these areas are near the end of their useful life, and will be in need of rehabilitation in order for the airport to remain an economic driver for the community.

Benefit Description

The airport is a driver for economic development and business growth. The Mt. Pleasant Airport is a major gateway to the Tribal community's casino and resort operations. The funding would help to ensure safe airport operations by having safe and reliable infrastructure. Entertainers and patrons alike, appreciate the convenience and service they experience at the airport when coming to visit or preform at the resort. Runways and Taxiways are the most important features for safe travel to and from the airport.

Funding Requirements

The funding request is for $50,000 for each of the next two years, to accumulate funds, which will assist in covering the match requirements for Federal and State grants for these required projects. This request is for the third contribution towards the required match.

Description of Reocurring Need

Project Timeline

Taxiway rehab spring 2024
Runway rehab Spring 2026

Budget Items

Name	Cost	Quantity	Total	Category
Runway/Taxiway Rehab	$50,000.00	1	$50,000.00	Transportation
AmountRequested	**$50,000.00**			

Matching Funds

Name	Cost	Quantity	Total
Runway/Taxiway Rehab Federal Grant	$4,950,000.00	1	$4,950,000.00
Runway/Taxiway Rehab State grant	$275,000.00	1	$275,000.00
Runway/Taxiway Rehab local share	$275,000.00	1	$275,000.00
AmountMatched	**$5,500,000.00**		

Budget Summary

Amount Requested

$50,000.00

Amount Matched

$5,500,000.00

Total Amount

$5,550,000.00

Uploaded Files

Name
No files have been uploaded.

There are no comments to display.

Overview

Project Name
1303 N Franklin Former Landfill Remediation

Total Requested
$50,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Low

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
jmoore@mt-pleasant.org

Applicant Email
Jason Moore

Organization
City of MtPleasant

Address
320 W Broadway St
MOUNT PLEASANT , 48858

Phone Number
9897795405

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Environmental

Project Description

This request is for funding to continue work at 1303 N Franklin Street (a City-owned property). We would continue work according to the advisement of our environmental consultant and the Michigan Department of Environment Great Lakes and Energy (EGLE). We are expecting to be able to begin remediation activities once the site assessment has been completed. This funding would be used for the eventual remediation project.

Community landfills were common throughout the state and country for several decades for the disposal of local trash. This former landfill was operated until 1975 for placement of general refuse from residents and business owners throughout the community. In the early 1980s, the landfill was closed and capped with clean fill material, as appropriate with the regulatory requirements applicable at the time. The City is working in conjunction with the State and Federal regulatory agencies to evaluate the environmental condition of the former landfill.

Previous funding awarded during the 2020-2022 two-percent processes have allowed for further characterization of the site and refinement of the Conceptual Site Model (CSM). Deep wells were installed in the spring of 2022 and have been sampled. The environmental consultant compiled data and put together a report of work done. It was determined that another deep well outside the landfill area should be installed and water tested to verify that the clay layer found during prior work is sufficient to eliminate the drinking water pathway. This work has been completed.

Benefit Description

The retired municipal landfill at 1303 N Franklin was utilized by Mt. Pleasant and the surrounding area from some time in the 1950s to 1975 when it was closed. Shortly after closure, the area had a clay cap placed over it to limit the rainwater entering the landfill area.

Funding for this project will allow for future work at the site in accordance with the advisement of our environmental consultant and the Michigan Department of Environment Great Lakes and Energy (EGLE).

Funding Requirements

Future funding requirements are unknown and will depend on the type of remediation that may be required.

Project Timeline

2025

Budget Items

Name	Cost	Quantity	Total	Category
Remediation	$50,000.00	1	$50,000.00	Environmental
AmountRequested	**$50,000.00**			

Matching Funds

Name	Cost	Quantity	Total
Remediation	$50,000.00	1	$50,000.00
AmountMatched	**$50,000.00**		

Budget Summary

Amount Requested

$50,000.00

Amount Matched

$50,000.00

Total Amount

$100,000.00

Uploaded Files

Name
Latest Site Report

There are no comments to display.

REPORT ON RESPONSE ACTIVITY PLAN IMPLEMENTATION

1301-1303 FRANKLIN STREET
MOUNT PLEASANT, MICHIGAN

SEPTEMBER 28, 2022

PREPARED FOR:

THE CITY OF MOUNT PLEASANT
DIVISION OF PUBLIC WORKS
MOUNT PLEASANT, MICHIGAN

320 WEST BROADWAY
MOUNT PLEASANT, MICHIGAN

Mannik Smith GROUP

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Mount Pleasant, Isabella County, Michigan

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Report on Response Activity Plan Implementation
1301-1303 Franklin Street
Mount Pleasant, Isabella County, Michigan

APPENDICES

1.0 INTRODUCTION

The Mannik & Smith Group, Inc. (MSG) was retained by the City of Mount Pleasant, Michigan to provide professional environmental consulting services for investigation of a former landfill area at City-owned property located north of the intersection of West Pickard and North Franklin Streets in Mount Pleasant. MSG has been assisting the City with regulatory compliance issues associated with the former landfill area since November 2020. An investigation of the former landfill was conducted by MSG in 2021 under an Agreement for Services with The City based on MSG's March 24, 2021 Proposal for Professional Services No. OP210419. The results of the investigation were documented in MSG's July 20, 2021 *Report on Investigation of Former Landfill*.

The investigation documented in the July 20, 2021 report focused primarily on delineation of the area of buried refuse, determining the suitability and engineering properties of the landfill's clay cap, and characterization of shallow groundwater conditions at the subject site. In addition, a Response Activity Plan for additional investigation of the former landfill was developed by MSG, as necessary and appropriate based on the findings contained in the above noted July 20, 2021 report and on regulatory requirements. The primarily objective of the additional investigation described in the September 8, 2021 Response Activity Plan (RAP) was characterization of site hydrogeologic conditions at depths below the base of the landfill.

The scope of work described in the September 8, 2021 RAP was implemented by MSG in 2022 under an Agreement for Services between the City of Mount Pleasant and MSG based on MSG's January 31, 2022 Proposal for RAP Implementation[1], as authorized by The City on February 14, 2022. This report presents the results of the RAP implementation activities.

1.1 Site Description

The subject site is located at 1301-1303 North Franklin Street in Mount Pleasant, Michigan, north of the intersection of North Franklin and West Pickard Streets. *Figure 1, Site Location*, depicts the location of the site as referenced to nearby roads and geographic features. The site is located north of and adjacent to the City's Wastewater Treatment Plant facility (1301 North Franklin) and facilities of the City's Street and Motor Pool Departments (1303 North Franklin), including a vehicle maintenance garage, a garage for storage of salt trucks, and other City-owned staging and storage areas. The site is located in a "SD-I (Industrial)" zoning district.

As shown on *Figure 2, Site Map*, the site is bordered by the Chippewa River on the west side. A golf course is located adjacent to the site on the north and northwest sides. A cemetery is located directly east of the site. Surrounding properties to the south and west of the site and north of West Pickard Street are primarily commercial/industrial. The area located south of West Pickard is primarily residential.

The central portion of the site is occupied by an area that was a formerly used as a landfill. There are low-lying wet areas located north and northeast of the former landfill area. A wooded area with numerous patches of wet ground is located east and northeast of the landfill area. Most of the western and northwestern portions of the site, including the area of the site located along the Chippewa River, are heavily wooded and vegetated. Access to most of the wooded/wet areas located to the north, west, and northeast of the former landfill area is very limited.

[1] MSG Proposal No.OP220226

1.2 Project Background

The landfill at the subject site reportedly operated from the 1950s until approximately 1975. For at least part of that time (in the 1960s), the landfill was licensed as a Solid Waste Disposal Area under former Michigan Public Act 87 (Garbage and Refuse Disposal Act). The landfill has a clay cap. The Chippewa River borders the site on the west, although it does not appear that the former landfill area extends laterally to the river.

In late 2018, a clay tile pipe located on the riverbank at the site was identified to be draining into the river. Further investigation by City personnel found four additional pipes near the former landfill area. Water being discharged by the clay pipes was sampled and analyzed. Subsequent investigation by the City and an environmental services provider contracted by the City found elevated levels of regulated substances in the discharge water, including elevated levels of per and polyfluoroalkyl substances (PFAS). Initial investigation of groundwater at the site conducted in 2019 indicated that PFAS concentrations in site-specific shallow groundwater samples exceeded regulatory levels (Michigan Public Act 451[2] Part 201 Generic Cleanup Criteria) for both the drinking water (DW) and groundwater surface water interface (GSI) exposure pathways.

Additional monitoring wells were installed at the site in 2019-2020 by others and additional groundwater samples were collected and analyzed. The groundwater sample analytical results indicated that PFAS concentrations and concentrations of other analytes (metals, volatile organic compounds, semivolatile organic compounds, and polychlorinated biphenyls) exceeded Part 201 residential and/or nonresidential Generic Cleanup Criteria (GCC). The site-specific shallow groundwater flow direction was not determined. Deeper groundwater underlying the site was not investigated.

The City of Mt. Pleasant has been working closely with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Remediation and Redevelopment Division (RRD) since the discharge into the Chippewa River was first discovered. Seventeen groundwater monitoring wells were installed in and around the landfill area at the site in 2019-2020 by AKTPeerless (AKT) of Saginaw, Michigan. Groundwater samples have been collected from most of the wells and have been analyzed for an extensive parameter list. The clay pipes have reportedly been grouted and capped.

MSG conducted Ground Water Testing Project Number 3 for the City in November and December 2020 under the scope of work specified in the August 2020 Request for Proposals issued by the City. Nine additional shallow groundwater monitoring wells were installed by MSG in November 2020. Six of the nine monitoring wells installed by MSG are located in close proximity to the Chippewa River. Groundwater samples were collected in November 2020 from the nine new monitoring wells and from four of the previously installed monitoring wells. The November 2020 groundwater samples were analyzed for an extensive suite of analytes including PFAS compounds.

The results of Ground Water Testing Project Number 3 were documented in a report by MSG dated December 22, 2020. The results indicated that the shallow groundwater at some of the onsite monitoring well locations, including locations in close proximity to the Chippewa River, contained concentrations of PFAS compounds and dissolved phase metals (dissolved boron and dissolved arsenic) that exceeded Part 201 GCC for the DW and/or GSI exposure pathways. No PCBs were detected in the November 2020 groundwater samples. None of the samples contained volatile organic compounds or semi-volatile organics at concentrations that exceeded Part 201 GCC.

A meeting with City of Mount Pleasant, EGLE RRD, and MSG personnel was convened on February 22, 2021 to review the results of Ground Water Testing Project Number 3. During the meeting, EGLE RRD personnel outlined additional site characterization measures necessary for regulatory compliance under Part 201 of NREPA. As requested by the City of Mt. Pleasant, MSG developed a scope of work to complete the next phase

[2] The Natural Resources and Environmental Protection Act (NREPA), Michigan Public Act 451, 1994 as amended.

of site characterization required by EGLE (MSG Proposal No. OP 210419 dated March 2, 2021). Following a request by EGLE RRD personnel, the scope of work was revised to include a shallow groundwater monitoring event. The revised MSG proposal No. OP 210419 was reissued to the City on March 24, 2021 and was authorized by the City on April 14, 2021. The investigation conducted by MSG in 2021 included:

- Determining the exact locations, ground surface elevations, top of well casing elevations, total depths, and overall condition of the site monitoring wells. Seventeen monitoring wells were installed at the site by AKT in 2019-2020. Nine additional monitoring wells were installed at the site by MSG in 2020. In addition, 6 monitoring wells were reportedly installed at the site by Keck Consulting Services, Inc. (Keck) in 1977.
- Measuring and recording static groundwater levels in each of the site monitoring wells, referenced to the respective well top of casing elevations.
- Determining the site-specific groundwater flow direction for the shallow groundwater zone.
- Conducting a groundwater monitoring event utilizing existing groundwater monitoring wells located near the Chippewa River and the wet areas in the northern and northeast portions of the site.
- Investigating the lateral and vertical extent of buried refuse at the site and the composition of the refuse.
- Determining the thickness of the landfill cover (clay cap).
- Collecting samples of the landfill cover materials and testing selected samples for relevant engineering properties.
- Preparing a technical report documenting the investigative methods and findings.
- Developing a work plan (Response Action Plan) for additional investigation, as necessary and appropriate based on the available data and information and EGLE RRD regulatory requirements under Part 201 of NREPA.

The results of the 2021 investigation indicated that the site-specific shallow groundwater flows to the west/northwest towards the Chippewa River with a flow velocity of 3.2-7.8 feet/day (1168-2847 feet/year) and an average hydraulic conductivity of 0.033 cm/sec (93.5 feet/day). The area of buried refuse at the site is approximately 17 acres. The known maximum depth of buried refuse is on the order of approximately 26-30 feet below the ground surface (bgs). The observed buried refuse consists primarily of paper (including decomposing newspaper); metal (including aluminum cans); glass fragments; metal fragments; construction and demolition debris including wood, concrete debris, roofing materials, and bricks; cloth/fabric; and fibrous materials of uncertain origin. The buried refuse was most commonly mixed with soil including sand, clayey sand, and sandy clay. In general, there was more soil and wood than refuse present in the soil/refuse mixture.

The results of the May 2021 shallow groundwater monitoring event indicated that PCBs and SVOCs were not detected in the shallow groundwater samples. One VOC was detected in one shallow groundwater sample at a concentration below residential and nonresidential GCC. The reported dissolved arsenic, dissolved aluminum, and dissolved boron concentrations of some of the May 2021 shallow groundwater samples exceeded the respective GCC for the drinking water exposure pathway. The dissolved arsenic concentrations for two of the shallow groundwater samples exceeded the respective GSI GCC. The reported PFAS concentrations for the groundwater samples from 6 of the shallow groundwater monitoring wells were above the respective DW GCC. The reported PFOS[3] concentrations for the groundwater samples from 4 of the shallow monitoring wells were above the GSI GCC for PFOS.

The buried refuse at the site is covered by a clay cap that is at least two feet thick. The results of geotechnical engineering tests completed on samples of the clay cap materials indicate that the clay cap is generally suitable for landfill cover purposes.

[3] PFOS (Perfluorooctanesulfonic Acid) is a PFAS compound that is regulated under Part 201 of NREPA

The September 8, 2021 Response Action Plan was formally submitted to EGLE RRD on December 6, 2021 and was approved with conditions by EGLE via correspondence dated December 14, 2021.

2.0 PURPOSE AND SCOPE

The primary objective of the work described in the Response Activity Plan was to investigate and characterize site-specific hydrogeologic conditions at depths below the base of the former landfill and below the shallow groundwater zone at the site. Based on the information provided on the logs for existing AKT monitoring wells MW-3-19, MW-4-19, MW-5-19 and MW-6-19 and the ground surface elevations at those locations determined by MSG during the 2021 monitoring well survey, the base of the former landfill is at elevations generally on the order of 740-750 feet, assuming that buried refuse extends to a maximum depth of 26 feet bgs as noted on the AKT logs. Therefore, the RAP implementation activities included characterizing site-specific hydrogeologic conditions at depths below an approximate elevation of 745 feet.

The investigation of deep groundwater conditions at the site included five primary tasks:

1. Deep exploratory borings
2. Installation of deep groundwater monitoring wells
3. Soil laboratory testing
4. Deep monitoring well sampling and analysis
5. Shallow groundwater sampling and analysis
6. Data review, evaluation, and technical report preparation

The RAP implementation activities were directed and overseen by a Certified Professional Geologist (CPG) from MSG's Canton, Michigan office. The individual tasks are described below in more detail.

3.0 FIELD INVESTIGATION

The field portion of the RAP implementation activities was conducted by MSG personnel in April and May 2022 under the direct supervision of a Certified Professional Geologist (CPG) from MSG's Canton, Michigan office. Six deep exploratory borings were drilled and sampled during the period of April 11-13, 2022. Groundwater monitoring wells were installed in three of the exploratory borings. A shallow groundwater sampling event was conducted by MSG field personnel on May 16, 2022.

The six deep exploratory borings were drilled and sampled to depths of 40-50 feet below the ground surface, corresponding to elevations of approximately 704.2 feet to 719.5 feet. Low permeability cohesive soils (glacial till and hardpan-like till) were encountered at depth in each of the six exploratory borings. The glacial till/hardpan soils extended to the boring terminus depth at each of the deep exploratory boring locations. No deep water-bearing zones or lower aquifers were encountered in the April 2022 borings. Therefore, three new groundwater monitoring wells were installed at the base of the uppermost groundwater bearing zone, with two of the three new monitoring wells located upgrdadient of the landfill area and one at a downgradient location.

Photographs of the RAP implementation field activities are included in *Appendix A, Photo Log*.

3.1 Deep Exploratory Borings

Six deep exploratory borings, designated SB-19 through SB-21 and MW-200 through MW-202, were drilled and sampled at the approximate locations shown on Figure 2. The borings were drilled and sampled by Cascade Environmental of Flint, Michigan using a rubber track mounted Boart Longyear LS 250 Minisonic drill rig and rotosonic drilling methodology. A subsurface utility staking request was made through the MISS DIG utility locating system prior to commencement of drilling and sampling. The boring logs are included in *Appendix B, Boring and Monitoring Well Logs*.

The rotosonic drilling method uses high-frequency resonant energy to advance a core barrel into the subsurface formations. The resonant energy is transferred down the drill string to the drill bit face at various sonic frequencies. The subsurface materials are continuously cored and recovered using a 4-inch diameter steel coring barrel. The 4-inch diameter coring barrel is overridden by a six-inch diameter steel barrel that cases the borehole and prevents collapse. Water is used when necessary to reduce drilling friction and heat buildup.

As shown on Figure 2, borings SB-19 and SB-20 were located within the area of buried refuse. Each of these borings was drilled and sampled to a depth of 50 feet bgs (boring terminus elevations of 719.5 feet for each boring). Boring SB-21 was drilled to a depth of 40 feet bgs (terminus elevation of 706.5 feet) near the location of groundwater monitoring well MW-102 and approximately 60 feet from the Chippewa River. Borings MW-200 and MW-201 were each drilled to a depth of 50 feet (boring terminus elevations of 706 feet and 711.1 feet, respectively), near the eastern site boundary. Boring MW-202 was drilled to a depth of 40 feet bgs (terminus elevation of 704.2 feet) in relatively close proximity to the northwest corner of the area of buried refuse.

Four-inch diameter soil cores were collected at each boring location on a continuous basis from the ground surface to the respective boring terminus depths. Five foot long coring runs were used in the uppermost 10 feet of drilling, followed by 10-foot long runs from 10 feet bgs to the respective boring terminus depths. Sample recovery, as shown on the boring logs in Appendix B, was generally good, with 100% recovery in many cases. The recovered soils at each boring location were examined and logged in the field by an experienced MSG field geologist/CPG.

Upon completion of drilling and sampling, borings SB-19, SB-20, and SB-21 were backfilled with hydrated bentonite[4] suitable for borehole decommissioning in environmental applications. Borings MW-200, MW-201, and MW-202 were used for installation of new groundwater monitoring wells, as described below in Section 3.2.

The locations of the borings were surveyed by MSG field personnel using a hand-held global positioning system (GPS) instrument with sub centimeter accuracy capability. The ground surface elevations at the locations of borings SB-19, SB-20, and SB-21 were also surveyed by MSG field personnel using a sub centimeter accuracy capability GPS unit. The ground surface elevations at the locations of the borings used for installation of groundwater monitoring wells (borings MW-200, MW-201, and MW-202) were surveyed by a professional survey crew from MSG's Canton, Michigan office under the supervision of an MSG State of Michigan licensed Professional Surveyor.

3.2 Monitoring Well Installation

Groundwater monitoring wells were installed in borings MW-200, MW-201, and MW-202 upon completion of drilling and soil sampling. The locations of the monitoring wells, also designated MW-200, MW-201, and MW-202 are shown on Figure 2. The monitoring well construction details are included on the boring/monitoring wells logs in Appendix B. Additional monitoring well information, including the location coordinates and elevations, is provided on *Table 1, Monitoring Well Information*.

Each well assembly consists of a 2-inch diameter 10-slot[5] Schedule 40 PVC well screen flush threaded to 2-inch diameter Schedule 40 PVC riser pipe. As shown on the boring/monitoring well logs in Appendix B, the well screens for MW-200, MW-201 and MW-202 were set at the approximate base of the glacial lacustrine sand and gravel deposit that is the uppermost groundwater bearing geologic unit at the site. There were no

[4] Puregold Medium Chips (NSF/ANSI/Standard 60 certified) manufactured by Cetgo/Minerals Technologies Incorporated
[5] A 10-slot well screen has 0.010 inch openings

lower aquifers encountered in the deep exploratory borings. Each boring was terminated in low permeability cohesive glacial till material. Therefore, no deep monitoring wells were installed.

The well screens for MW-200 and MW-201 are 10 feet long and are set from 15-25 feet bgs. MW-202 has a five-foot long screen set from 4-9 feet bgs. Each well is equipped with an above ground riser and an above ground steel protective cover secured in a concrete pad at the ground surface.

The wells were developed by surging and pumping until the purge water became relatively clear. A professional survey crew from MSG's Canton, Michigan office surveyed the top of casing elevations of new monitoring wells MW-200, MW-201, and MW-202 to the nearest 0.01 foot. The survey crew's work was conducted under the supervision of a State of Michigan licensed Professional Surveyor from MSG's Canton office.

3.3 Groundwater Sampling and Analysis

A groundwater monitoring event was included as part of the RAP implementation activities. The following monitoring wells were sampled by MSG field personnel on May 16, 2022: MW-101 through MW-106, MW-108, MW-109, MW-9-20, MW-10-20, MW-14-20, MW-15-20, MW-200, MW-210, and MW-202.

The static groundwater level in each sampled well was measured by MSG personnel using an electronic water level meter prior to well purging and groundwater sampling. Static groundwater levels were also measured in monitoring wells MW-107, MW-1-19, MW-2-19, MW-7-20, MW-12-20, MW-16-20, MW-17-20, and MW-X. The water level meter has an accuracy of +/- 0.01 feet (approximately 1/8 inch). The static groundwater level measurements were recorded on field sampling forms that are included in *Appendix C*, *Field Sampling Forms*.

MSG personnel then purged and sampled the groundwater monitoring wells in general accordance with the United States Environmental Protection Agency (USEPA) *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures* guidance document (EPA/540/S-95/504, April 1996). Groundwater samples were collected using a peristaltic pump equipped with high-density polyethylene (HDPE) tubing. A new HDPE disposable bailer and nylon rope were used for sampling monitoring well MW-109. Groundwater samples for PFAS analysis were collected in general accordance with the October 16, 2018 EGLE guidance document entitled *General PFAS Sampling Guidance*.

Water quality field parameters including pH, specific conductance, temperature, oxidation-reduction potential, specific conductance, turbidity, and dissolved oxygen were monitored during purging and sampling activities using a Horiba U-52 Multiparameter Water Quality Meter and Flowcell. Samples collected for metals analysis were filtered at the time of sampling using 0.45-micron disposable filters specifically designed for environmental groundwater sampling. A blind duplicate groundwater sample designated DUP was collected from monitoring well MW-200. A PFAS field blank sample was also collected at the location of MW-200 while MW-200 was being purged and sampled.

As noted on the field sampling forms in Appendix C, Monitoring wells MW-108 and MW-9-20 purged dry on May 16, 2022 and did not recharge sufficiently to allow for collection of groundwater samples.

The groundwater samples, PFAS field blank sample, and a laboratory-supplied trip blank sample were submitted under standard chain of custody protocol to the ALS Environmental laboratory in Holland, Michigan (ALS) for analysis. The groundwater samples were analyzed for VOCs, SVOCs, PCBs, sixteen dissolved metals[6] and the PFAS compounds on the October 1, 2019 EGLE PFAS compound list, as specified in the RAP. PFAS analysis was conducted by Method EPA 537 Modified (537 Mod - isotope dilution method).

[6] The 10 Michigan metals (arsenic, barium, cadmium, chromium, copper, mercury, lead, selenium, silver, and zinc) and aluminum, antimony, beryllium, boron, nickel, and thallium.

The laboratory analytical data report provided by ALS is included in *Appendix D, Laboratory Analytical Report (Groundwater)*. The May 16, 2022 groundwater sample analytical results are tabulated on *Table 2*, *Groundwater Sample Analytical Data – Residential Criteria*, and *Table 3*, *Groundwater Sample Analytical Data – Nonresidential Criteria*.

3.4 Soil Sample Testing

Twelve soil samples from the 4-inch diameter rotosonic drilling cores were collected for analysis for hydrogeologic/geotechnical engineering properties. The twelve soil samples included one sample of the granular glacial lacustrine sand and gravel materials within the screened interval of each of the three new groundwater monitoring wells installed (MW-200, MW-201, and MW-202), and nine samples of the cohesive glacial till materials that were encountered underneath the lacustrine sand and gravel and underneath the buried refuse within the former landfill area. At least one glacial till sample was collected from each deep exploratory boring for analysis.

The three granular lacustrine sand and gravel deposit samples were analyzed by MSG's Canton, Michigan Soil Mechanics Laboratory for grain size distribution by sieve analysis (ASTM D6913). The following lacustrine sand and gravel deposit samples were analyzed:

- Boring MW-200, 17-20 feet bgs
- Boring MW-201, 20-24 feet bgs
- Boring MW-202, 5-7 feet bgs

The nine samples of the cohesive glacial till soils that underlie the glacial sand and gravel and buried refuse at the site were analyzed for grain size distribution by sieve and hydrometer (ASTM D7928) and Atterberg Limits (ASTM D4318). The following glacial till soil samples were analyzed:

- Boring MW-200, 25.5-30 feet bgs
- Boring MW-200, 37-39.5 feet bgs
- Boring MW-201, 29-30 feet bgs
- Boring MW-201, 39-40 feet bgs
- Boring MW-202, 8.5-10 feet bgs
- Boring SB-19, 34-35 feet bgs
- Boring SB-19, 47-49 feet bgs
- Boring SB-20, 45-50 feet bgs
- Boring SB-21, 23-25 feet bgs

The grain size distribution and Atterberg Limits test results are included in *Appendix E*, *Soil Sample Test Data*. The test results are discussed further in Section 4.2 of this report. Photographs of the analyzed soil samples are included on pages 14-18 of the Photo Log in Appendix A.

4.0 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) presented below for the subject site is based on currently available data and information regarding site hydrogeologic conditions. Like any CSM, it can be modified and updated as additional information and data become available.

4.1 Regional Hydrogeology

The subject site is located in the Saginaw glacial lobe in the south-central portion of the Michigan Basin geomorphic province. The Michigan Basin is a bowl-shaped intracratonic crustal depression that contains several thousand feet of relatively flat-lying sedimentary rocks deposited during the Paleozoic geologic era. These sedimentary rocks overlie older Precambrian age crystalline basement rocks. The maximum thickness of accumulated sedimentary rocks in the Michigan Basin is approximately 15,000 feet in the Midland area of the Lower Peninsula. In general, the Michigan Basin rocks are predominately carbonate evaporates of marine origin (dolomite and limestone) with lesser amounts of shale and sandstone.

Pleistocene age glacial drift sediments overlie the bedrock throughout most of the Michigan Basin. The glacial features are the result of advancing and retreating continental glaciers during the Wisconsin glacial stage of the Pleistocene epoch (approximately 35,000 to 10,000 years before present). The glacial drift ranges in thickness from less than 10 feet to several hundred feet. Glacial drift greater than 1,000 feet thick has been documented in parts of the north central Lower Peninsula of Michigan (Western Michigan University, 1982). Bedrock exposures in the Lower Peninsula are rare. Bedrock is not exposed in the Mount Pleasant area.

The glacial drift deposits in Isabella County range generally from 150 to 600 feet in total thickness and include: granular outwash deposits, lacustrine deposits, and glacial till characteristic of morainal terranes (Apple and Reeves, 2007). The till deposits are generally medium to coarse textured material but can range from clay to boulder size. The tills are found in three prominent glacial moraines that occur in the western portion of Isabella County, including the Gladwin Moraine. The glacial outwash deposits are composed primarily of sand and gravel. The lacustrine deposits can consist of sand, gravel, silt and/or clay.

The regional geologic setting of the site is shown on *Figure 3, Regional Geologic Setting*. The site is located on the western fringe of the Saginaw Lowlands, an extensive, relatively flat-lying glacial lake plain that formed when glacial ice retreated northeast from the Gladwin Moraine to Saginaw Bay (Westjohn and Hoard, 2006). The Gladwin Moraine allowed ponding of glacial meltwater and subsequent deposition of glacial lacustrine sediments when the Saginaw Lobe glacial ice retreated to Saginaw Bay and formed the Port Huron Moraine.

As shown on Figure 3, the subject site is located in an area of glacial lacustrine sand and gravel. The Gladwin Moraine is located to the west, northwest and southeast of the site. The glacial drift in the region is reported to be on the order of 280-350 feet thick (Western Michigan University, 1981; Westjohn and Hoard, 2006; Newcombe, 1933). The regional bedrock formations underlying the glacial drift are the Jurassic Red Beds and the Pennsylvanian age Saginaw Formation, neither of which are exposed at the surface in the Mount Pleasant area. The Jurassic Red Beds bedrock formation has been described as red mudstone, red sandstone/siltstone, and gypsum (Westjohn and Hoard, 2006), and as sandstone and shale with minor limestone and gypsum beds (Dorr and Eschman, 1970). The Pennsylvanian age Saginaw Formation bedrock consists primarily of sandstone with some interlayered shale, limestone, and coal beds. The bedrock underlying the glacial drift deposits at the site has been identified as the Jurassic Red Beds (Westjohn and Hoard, 2006).

Groundwater occurs regionally in the Pleistocene glacial deposits and in the underlying bedrock formations. Groundwater in the glacial lacustrine sand and gravel and glacial outwash deposits has been used historically for domestic use. Freshwater is encountered in the glacial deposits of the region, although saline water has been observed near the base of the glacial deposits. Both freshwater and saline water have been encountered in the underlying bedrock formations.

Glacial sands and gravels form the principal aquifer for domestic water supply wells in the region (Westjohn and Hoard, 2006). Apple and Reeves (2007) note that “According to the February 2005 Wellogic database, approximately 99 percent of the wells in Isabella County are completed in the glacial deposits, and less than 1 percent in the bedrock units.“

Interpretation of well drillers' logs for water supply wells in the Wellogic database has identified a regional sand and gravel aquifer at depths ranging from approximately 60-130 feet bgs. These sands and gravels have been interpreted as glaciofluvial deposits from an outwash plain that form a regional glacial aquifer. Deeper aquifers in the 130-320 feet bgs depth interval within the glacial deposits of the region have also been identified.

In 2006, the United States Geological Survey published a report by D.B. Westjohn and C.J. Hoard titled *Hydrogeology and Groundwater Quality, Chippewa Township, Isabella County, Michigan, 2002-2005,* (U.S. Geological Survey Scientific Investigations Report 2006-5193). That report, which covered a study area that included the City of Mount Pleasant and contiguous townships, notes that logs of water supply wells in Chippewa Township (located directly east of Mount Pleasant) "indicate the presence of a near-surface clay-rich unit in almost all areas. This upper clay unit is probably basal-lodgment till that was deposited by the Saginaw Lobe of glacial ice when ice advanced to the position of the Gladwin Moraine." The upper clay rich lodgment till described by Westjohn and Hoard (2006) is likely represented at the subject site by the till clay and hardpan-like till encountered directly below the surficial glacial lacustrine sand and gravel in the six deep exploratory borings completed at the subject site for the RAP implementation activities. Additional discussion is provided below in Section 4.2 of this report.

Westjohn and Hoard (2006) constructed a potentiometric surface map of groundwater in the glacial deposits of the region, based on static water levels recorded on 1,559 regional water supply wells. As shown on *Figure 4*, *Regional Groundwater Flow Direction*, there is a prominent sense of groundwater flow potential to the east for the glacial groundwater.

The City of Mount Pleasant owns and operates a municipal water supply system that supplies potable water to the City. The Mount Pleasant municipal water supply is derived from municipal water supply wells. None of the City's water supply wells is located within one (1) mile of the site. The surrounding township, Charter Township of Union (Union Township) also provides municipal water. The Union Township water supply is derived from seven (7) groundwater wells configured in three (3) separate well fields. The Township's water supply wells are set in a glacial sand and gravel aquifer and are located more than one (1) mile from the site.

As noted in MSG's December 22, 2020 Report on Groundwater Testing Project Number 3, public records indicate that there are 18 domestic water supply wells located within a one mile radius of the site. These wells have reported depths ranging from 19-238 feet bgs and are set in the glacial drift materials. Eleven of the 18 wells are listed as household wells.

4.2 Site Hydrogeology

The locations of the deep exploratory borings completed in April 2022 (SB-19 through SB-21 and MW-200 through MW-202) are shown on Figure 2. The boring logs are included in Appendix B. The logs in Appendix B also include construction details for the groundwater monitoring wells that were installed in borings MW-200, MW-201, and MW-202. As noted on the boring logs, the deep exploratory borings were drilled and sampled to depths of 40-50 feet bgs. The corresponding boring terminus elevations range from 704.2 feet to 719.5 feet. Based on the subsurface information derived from borings SB-19 and SB-20, the elevation of the base of buried refuse at the site is at an approximate elevation of 739.5-740.3 feet.

The subsurface geologic units at the site include a surficial deposit of granular soils (glacial lacustrine sand and gravel) underlain by clay-rich glacial till. Subsurface profiles have been developed to illustrate the approximate configuration of the site geology relative to the area of buried refuse and the Chippewa River. The locations and orientations of the geologic profiles are shown on *Figure 5, Geologic Profile Location Map*. The profiles are shown on *Figure 6, Generalized Geologic Profile A-A'* and *Figure 7, Generalized Geologic Profile B-B'*.

As shown on Figures 6 and 7, the surficial lacustrine sand and gravel deposit extends vertically to approximately elevation 730-735 feet or approximately 5-10 feet below the base of the buried refuse. The underlying clay-rich glacial till was encountered in each of the six deep exploratory borings and extends vertically to elevation 705 feet or deeper. Each of the six deep exploratory borings completed for the RAP implementation was terminated in the till deposit. Numerous photographs of the lacustrine sand and gravel and the glacial till recovered from the rotosonic borings are included in the Photo Log in Appendix A.

As noted on the boring logs in Appendix B and the soil sample test results in Appendix E, the glacial lacustrine sand and gravel deposit at the subject site consists primarily of silty sand, gravelly sand, and sandy gravel, classified as SM, SP and GW, respectively under the Unified Soil Classification System (USCS). The underlying glacial till consists primarily of silty-sandy clay (USCS classification as CL), with lesser amounts of clayey sand (SC) and silty-clayey sand (SC-SM). Seven of the nine analyzed till samples consist of CL soil material (lean clay). One of the till samples consists of SC soil material (clayey sand). One of the analyzed till samples consists of SC-SM soil material (silty, clayey sand) under the USCS.

A sandy silt layer encountered in boring MW-200 in the 21-25.5 feet bgs depth interval represents a transition between the overlying lacustrine sand and the underlying glacial till. As shown on Figure 7, sandy fill soils were encountered from the ground surface to 14.5 feet bgs at the location of boring MW-200, which is located in the grassy area outside of the former office portion of the maintenance garage building. A number of subsurface utilities are located in this area.

The glacial till deposit encountered in the deep exploratory borings included hard to very hard till[7] and cemented hardpan-like till. These supplemental descriptions of the encountered till are noted on the boring logs. Very hard till was encountered from 8.5-40 feet bgs in boring MW-202, from 33.5-50 feet bgs in boring SB-19, from 40-44.5 feet bgs in boring SB-20, and from 12-25 feet bgs in boring SB-21. The cemented hardpan-like till was encountered in the borings at the following depth intervals:

- Boring MW-200 from 33-39.5 feet bgs and 47-50 feet bgs
- Boring MW-201 from 34.9-42 feet bgs
- Boring SB-20 from 44.5-50 feet bgs
- Boring SB-21 from 25-40 feet bgs

The hardpan-like till observed in the deep exploratory borings is analogous to the above noted near-surface upper clay-rich basal-lodgment till described by Westjohn and Hoard (2006).

Unconfined groundwater was encountered during drilling and soil sampling in April 2022 at depths ranging from 5-10 feet bgs. At the locations of borings MW-200 and MW-201, groundwater was encountered at 9 feet bgs in sandy fill soils and at 10 feet bgs in lacustrine silty sand, respectively. At the location of boring MW-202, groundwater was encountered at 5 feet bgs in lacustrine sandy gravel. At the location of boring SB-21, groundwater was encountered at 5 feet bgs in a silty clay layer located directly above a lacustrine sandy gravel layer at 7 feet bgs. Both MW-202 and SB-21 are located at lower elevations than borings MW-200 and MW-201.

Potable water was used during rotosonic drilling in the buried refuse at the locations of borings SB-19 and SB-20. The depth to encountered groundwater at those two boring locations could not be determined. The potable water from the City of Mount Pleasant municipal water supply system was obtained at the onsite maintenance garage (see Page 1 of the Photo Log in Appendix A).

[7] Hard corresponds to an estimated unconfined compressive strength of 8,000-16,000 pounds/square foot (PSF). Very hard corresponds to an estimated unconfined compressive strength of greater than 16,000 PSF.

The hydraulic conductivity of the shallow groundwater zone at the site can be approximated from grain size distribution data for the granular glacial lacustrine sand and gravel deposit using the empirical model developed by Hazen. The Hazen equation for soil hydraulic conductivity (K) can be expressed as K (in cm/sec) = $C(D_{10})^2$ where

C = Dimensionless constant equal to 1
D_{10} = Grain size (in millimeters) at which 10% of the soil sample mass (by dry weight) is comprised of less than this value

The available D_{10} values for the granular soil samples collected from the screened intervals of the onsite monitoring wells (MW-104, MW-105, MW-109, MW-200, MW-201 and MW-202) range from 0.075 to 0.443, with an average D_{10} value of 0.22. Using the average D_{10} value and the Hazen empirical equation, the estimated K value for the lacustrine sand and gravel at the subject site is 0.0484 cm/sec (137.2 feet/day). This K value is consistent with the range of K values for sand and gravelly sand soils found in the published literature.

Static groundwater levels were measured and recorded for each of the monitoring wells sampled on May 16, 2022 prior to purging and sampling. Static groundwater levels were also measured in monitoring wells MW-107, MW-1-19, MW-2-19, MW-7-20, MW-12-20, MW-16-20, MW-17-20, and MW-X on May 16, 2022. The static groundwater levels and corresponding piezometric surface elevations are provided on Table 1 and are shown graphically on *Figure 8, Groundwater Elevation Contour Map – May 16, 2022*.

The piezometric surface elevations shown on Figure 8 range from 738.04 feet at monitoring well MW-106 to 757.06 feet at monitoring well MW-7-20. The piezometric surface elevation for MW-7-20 is considered anomalously high for groundwater contouring. Monitoring well MW-7-20 was installed by AKT in February 2020 (prior to MSG's involvement with the subject site) and may be located within the area of buried refuse. The anomalously high peizometric surface elevation for MW-7-20 appears to be the result of groundwater mounding.

As shown on Figure 8, the sense of groundwater flow potential (primary groundwater flow direction) for the unconfined glacial lacustrine sand and gravel water-bearing zone at the site is to the west and northwest, generally towards the Chippewa River. It is noted that the Chippewa River bends generally eastward as it flows through the golf course property located directly north of the site beyond the view shown on Figure 8. As such, both the west and northwest shallow groundwater flow directions shown on Figure 8 indicate that the shallow groundwater flow towards the river.

Groundwater flow velocity at the site can be calculated using Darcy's Equation, $V = Ki/n_e$, where:

V = Groundwater flow velocity in feet per day
K = Hydraulic conductivity of the water-bearing unit in feet per day
i = Lateral hydraulic gradient in feet per foot (change in elevation ÷ change in lateral distance)
n_e = Effective porosity

Using the piezometric surface elevation data for May 16, 2022 shown on Figure 8, the site-specific shallow groundwater flow velocity for the site was calculated along the groundwater flow paths labeled as A, B, and C on Figure 8. The groundwater flow velocity calculations are provided on *Table 4, Groundwater Flow Velocity Calculations – May 16, 2022*. As shown on Table 4, the lateral hydraulic gradient was calculated to range from 0.0063 to 0.0068 ft/foot. Using the lateral gradients, an average hydraulic conductivity of 137.2 feet/day and an estimated effective porosity of 0.3, the calculated site-specific shallow groundwater flow velocity is 2.9-3.1 ft/day (1059-1132 ft/year).

5.0 GROUNDWATER SAMPLE ANALYTICAL RESULTS

The groundwater samples collected by MSG from monitoring wells MW-101 through MW-106, MW-109, MW-200, MW-201, MW-202, MW-10-20, MW-14-20, MW-15-20, and the blind duplicate sample collected from MW-200 on May 16, 2022 were analyzed by ALS for VOCs, SVOCs, PCBs, dissolved phase metals (10 Michigan metals plus aluminum, antimony, beryllium, boron, nickel, and thallium), and PFAS compounds (EGLE October 1, 2019 list). The field blank sample collected during groundwater sampling activities at the location of monitoring well MW-200 was analyzed for the above noted PFAS compounds. The laboratory analytical data report is included in Appendix D.

The May 2022 groundwater sample analytical data have been tabulated and compared to Part 201 Residential GCC on Table 2. The groundwater sample analytical results have also been compared to Part 201 Nonresidential GCC on Table 3. The data is discussed below in terms of parameter groupings. Exceedances of the GCC are depicted graphically on *Figure 9, Groundwater Sample Criteria Exceedances – May 16, 2022*.

PCBs - PCBs were not detected in any of the May 2022 groundwater samples.

SVOCs – SVOCs were not detected in any of the May 2022 groundwater samples.

VOCs – one VOC compound was detected in the groundwater sample from monitoring well MW-202. The reported chlorobenzene concentration of 6.1 micrograms/liter (ug/l) for the groundwater sample from MW-202 is below the residential and nonresidential DW GCC of 100 ug/l, and is also below the GSI GCC of 25 ug/l. No other VOCs were detected in the groundwater sample from MW-202. VOCs were not detected in any of the other May 2022 groundwater samples.

PFAS – as shown on Table 1 and Table 2, PFAS compounds were detected in each of the fourteen groundwater samples collected at the subject site on May 16, 2022. Exceedances of the DW GCC for PFAs compounds are observed for MW-101 (PFOS and PFOA[8]), MW-102 (PFOS and PFOA), MW-106 (PFOA), MW-109 (PFOA), MW-200 and the associated blind duplicate (PFOA), MW-201 (PFOA), MW-202 (PFOS, PFOA, PFHxS, and PFNA[9]), MW-10-20 (PFHxS, PFNA, PFOS and PFOA), MW-14-20 (PFOA), and MW-15-20 (PFOA). Exceedances of the GSI GCC for PFAS compounds are observed at MW-101 (PFOS), MW-102 (PFOS), MW-202 (PFOS), and MW-10-20 (PFOS).

The reported PFAS concentrations for the groundwater samples collected from monitoring wells MW-103, MW-104, and MW-105 are below the Residential and Nonresidential GCC for the drinking water exposure and GSI exposure pathways.

Metals – dissolved phase metals were detected in each of the groundwater samples collected at the site on May 16, 2022. Exceedances of the DW GCC are observed for the groundwater samples from monitoring wells MW-102 (dissolved boron), MW-103 (dissolved arsenic), MW-105 (dissolved arsenic), MW-109 (dissolved aluminum), and MW-202 (dissolved boron). Exceedances of the GSI GCC are observed for the groundwater samples from monitoring wells MW-103 (dissolved arsenic), and MW-105 (dissolved arsenic).

The reported dissolved metals concentrations for the groundwater samples collected on May 16, 2022 from monitoring wells MW-101, MW-104, MW-106, MW-200, MW-201, MW-10-20, MW-14-20, and MW-15-20 are below the Residential and Nonresidential GCC for the DW and GSI exposure pathways.

As shown on Figure 9, there are exceedances of the Part 201 Residential and Nonresidential GCC for the May 16, 2022 groundwater samples collected from monitoring wells located on the west, north and east sides of the landfill area. Most of the GCC exceedances for the GSI pathway occur west of the area of buried refuse at monitoring wells

[8] Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA), respectively

[9] Perfluorohexanesulfonic Acid (PFHxS) and Perfluorononanoic Acid (PFNA), respectively

MW-101, MW-102, MW-103, and MW-105 located along the Chippewa River, and at MW-202. Each of these monitoring wells is located hydraulically downgradient of the landfill area with respect to the shallow groundwater flow direction. The other monitoring well showing a GSI exceedance (MW-10-20) is located in close proximity to the northeast corner of the landfill area. It is likely that the extent of shallow groundwater with elevated concentrations of metals and/or PFAS extends downgraqdient from the landfill to the west and northwest to the Chippewa River, and to the north towards the river where it flows through the offsite golf course area.

The May 2022 groundwater samples collected from monitoring wells located east and southeast of the landfill (MW-200 and MW-201) show exceedances of the DW GCC for PFOA, but do not exhibit GSI exceedances. MW-201 is located hydraulically upgrqadient of the area of buried refuse. MW-200 appears to be in a cross-gradient location. Both MW-200 and MW-201 are located outside of the groundwater flow path of the area of buried refuse, indicating the possibility of an upgradient, offsite source or sources to the east or southeast of the site.

The Michigan PFAS Action Response Team (MPART) is a team of seven state government agencies[10] created in 2017 by executive order of the Governor to identify PFAS sources and address PFAS contamination in Michigan. MPART became an advisory body within EGLE in 2019. MPART maintains a List of PFAS Sites and Areas of Interest and an associated PFAS Geographic Information System (GIS). The MPART GIS shows three PFAS sites in the Mt. Pleasant area including:

1. The subject site
2. The Roosevelt Refinery site (600 W. Pickard Street)
3. The 104 North Kinney Avenue site (104 North Kinney Avenue)

The Roosevelt Refinery was a crude oil refinery that operated from the 1930s to the early 1970s. It is located at 600 W. Pickard Street on the west side of the Chippewa River opposite the subject site. The location of the Roosevelt Refinery on the west side of the Chippewa River makes it an unlikely source of groundwater impacts to the subject site.

The 104 North Kinney Avenue (NKA) site is an operating commercial dry cleaner that is reportedly associated with a plume of tetrachloroethylene-impacted groundwater. According to the EGLE MPART listing, concentrations of tetrachloroethylene (PCE) have been found several blocks downgradient of the NKA site. According to the EGLE MPART listing for the NKA site, nine of seventeen groundwater samples collected in November 2021 at locations surrounding the NKA site had PFOA concentrations above the DW GCC of 8 nanograms/liter (ng/l – equivalent to parts per trillion). The highest reported concentration was 160 ng/l.

The EGLE listing also notes that groundwater contamination associated with the NKA site is found in the 12-15 feet bgs depth range, and that groundwater flows to the northwest toward the Chippewa River. The NKA site is located approximately 0.8 miles southeast of the subject site. Based on its location relative to the location of the subject site and the northwest direction of shallow groundwater flow in the area, the NKA site could represent a possible upgradient offsite source of shallow groundwater contamination relative to the subject site.

6.0 PATHWAY EVALUATION

An exposure pathway is the link between a contaminant source and a receptor. An exposure pathway has five components:

1. A source of contamination
2. A transport mechanism
3. A point of exposure

[10] The seven state agencies are EGLE and the Departments of Health and Human Services, Natural Resources, Agriculture and Rural Development, Transportation, Military and Veteran Affairs, and Licensing and Regulatory Affairs.

4. A route of exposure
5. A receptor population

When the five components are present, the pathway is considered complete.

For the subject site, the contaminant source is the landfill area. For the GSI exposure pathway, the transport mechanism is leaching and groundwater transport. The point of exposure is the water of the Chippewa River. The route of exposure is the shallow groundwater zone within the near surface glacial lacustrine sand and gravel deposit at the site. Receptors include aquatic organisms in the river, other organisms that may ingest the river water (e.g., deer, birds, farm animals, etc.), and possible recreational users. Although the Chippewa River water is not used locally or regionally as a source of potable water supply, it is a tributary to the Tittabawassee River. The Tittabawassee is a tributary to the Saginaw River. The Saginaw River empties into Saginaw Bay near Bay City. The GSI exposure pathway is considered complete for the subject site.

The unconfined shallow groundwater in the near surface glacial lacustrine sand and gravel deposit is the uppermost aquifer at the site. The near surface glacial lacustrine deposit groundwater flows toward the Chippewa River and presumably vents into the river at an elevation of approximately 733 feet along the west side of the site. The cohesive glacial till deposit that underlies the glacial lacustrine sand and gravel deposit across the site extends vertically to elevation 700 or lower. The till deposit acts as an aquitard preventing vertical migration of shallow groundwater into deeper aquifers that may be present and that may be used locally or regionally as sources of potable water. Therefore, the groundwater ingestion as drinking water exposure pathway is considered to be incomplete for the subject site.

The area of buried refuse at the subject site has a compacted clay cap. The clay cap is covered by extensive native grasses and other vegetation. The clay cap and surface vegetation prevent direct contact with the underlying buried refuse. The clay cap also acts as a barrier to vertical migration of landfill gas into ambient air.

The available records provided by the City for the landfill at the subject site indicate that construction of the landfill did not include gas management components, side slope liners, or a perimeter dike. Therefore, lateral migration of subsurface landfill gas, including methane, could be possible. There have been no known occurrences of lateral migration of subsurface gas from the landfill area. Although there are no aboveground structures present within the footprint of the landfill area, there are buildings located in close proximity to the landfill that are used by City personnel for municipal activities.

7.0 CONCLUSIONS

Based on the results of the RAP implementation activities completed for the former Mount Pleasant landfill as described herein, the following conclusions are made:

- The site is underlain by a near surface granular glacial lacustrine deposit that is on the order of 10-25 feet thick, depending on location and elevation within the site. The granular lacustrine deposit is underlain by a relatively thick, low permeability cohesive glacial till deposit that is extensive both laterally and vertically. The till deposit was encountered at depth in each of the six deep exploratory borings completed for the RAP implementation activities. The base of the till deposit was not encountered in any of the deep exploratory borings.
- The uppermost groundwater occurs in the granular lacustrine deposit under unconfined conditions. The underlying till deposit acts as a lower confining layer preventing vertical migration of the shallow groundwater. No lower groundwater zones were encountered in the deep exploratory borings completed for the RAP implementation.
- The site-specific shallow groundwater flow direction is primarily to the west and northwest towards the Chippewa River. The average hydraulic conductivity of the shallow groundwater zone is 0.0484 cm/sec (137.2 feet/day). The shallow groundwater flow velocity is approximately 3 feet/day (1,095 feet/year).

- The results of the May 2022 shallow groundwater monitoring event indicate that PCBs and SVOCs were not detected. One VOC was detected in one shallow groundwater sample at a concentration below the residential and nonresidential GCC. The reported dissolved arsenic, dissolved aluminum, and dissolved boron concentrations of some of the May 2022 shallow groundwater samples exceed the respective GCC for the drinking water exposure pathway. The dissolved arsenic concentrations for two of the shallow groundwater samples exceed the respective GSI GCC. The reported PFAS compound concentrations for the groundwater samples from 10 of the shallow groundwater monitoring wells were above the respective DW GCC. The reported PFOS concentrations for the groundwater samples from 4 of the shallow monitoring wells were above the GSI GCC for PFOS.

8.0 REFERENCES

Apple, B. A., and Reeves, H.W., 2007, Summary of Hydrogeologic Conditions by County for the State of Michigan, U.S. Geological Survey Open-File Report 2007-1236.

Dorr, J.A., and Eschman, D.F., 1970, Geology of Michigan, The University of Michigan Press.

Newcombe, R.B., 1933, Oil and Gas Fields of Michigan, Michigan Department of Conservation Geological Survey Division Publication 38, Geological Series 32.

United States Environmental Protection Agency (USEPA), 1996, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures guidance document (EPA/540/S-95/504, April 1996).

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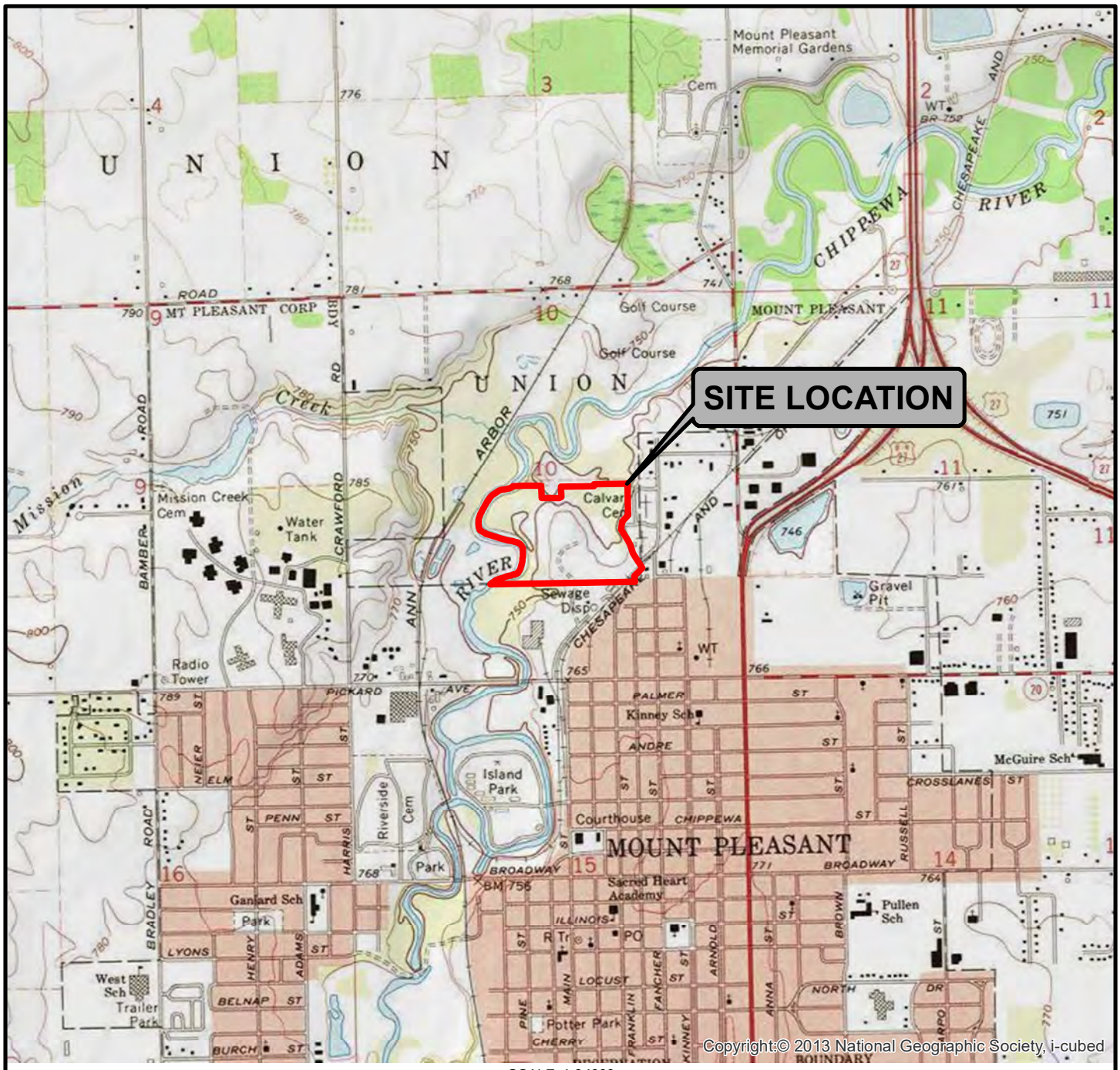
Westjohn, D.B., and Hoard, C.J., Hydrogeology and Groundwater Quality, Chippewa Township, Isabella County, Michigan, 2002-2005, U.S. Geological Survey Scientific Investigations Report 2006-5193.

FIGURES



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1 ½ 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

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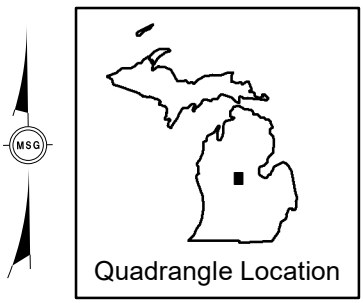

NOTE: Map adapted from National Geographic TOPO! seamless, scanned images of USGS Topographic Maps, Rosebush and Mount Pleasant, MI (7.5 minute series).

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FIGURE 1

SITE LOCATION

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
12/10/2020	ZTR	CJB	M3460001

Date Saved: 11/17/2020 3:15:19 PM
Path: C:\Users\ZRogers\Desktop\GIS M3460001\Map Files\Fig1_SiteLocationMap.mxd

Legend

- Soil Boring Location - MSG (May 2021)
- Soil Boring Location - MSG (April 2022)
- PVC Monitoring Well - MSG (Nov. 2020)
- PVC Monitoring Well -- MSG (April 2022)
- PVC Monitoring Well - AKT (2019-2020)
- Steel Monitoring Well - Keck (1977)
- Monitoring Well - Undocumented Origin
- Approximate Extent of Buried Refuse
- Site Boundary (Approximate)

0 200 400

Feet

Notes:

1. Site boundary adapted from parcel boundaries provided on the Isabella County website and AKTPeerless "Site Map" dated July 26, 2020.
2. Aerial imagery collected on November 18, 2020.
3. 2-inch diameter steel monitoring wells are believed to be wells installed by Keck in 1977.
4. Monitoring well MW-11-20 could not be located in the field.

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FIGURE 2

Site Map

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
4/20/22	CJB	DJA	M3460003

Date Saved: 4/25/2022 9:26:19 AM
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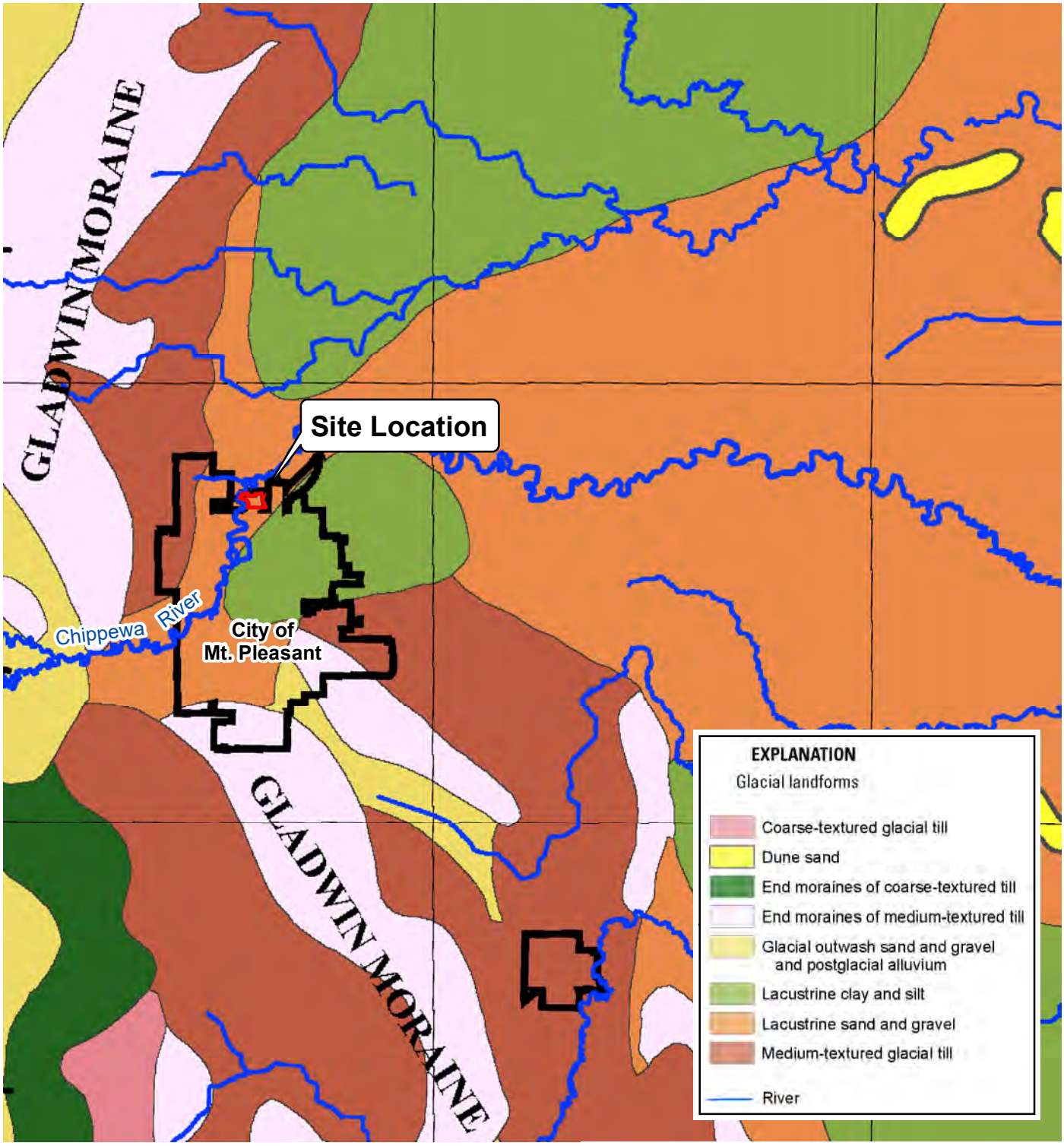

0 1 2 4

Miles

MSG

Notes:
1. Modified from Westjohn and Hoard, 2006.

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FIGURE 3

Regional Geologic Setting

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
11/30/2020	ZTR	ZTR	M3460001

Date Saved: 11/30/2020 4:53:10 PM
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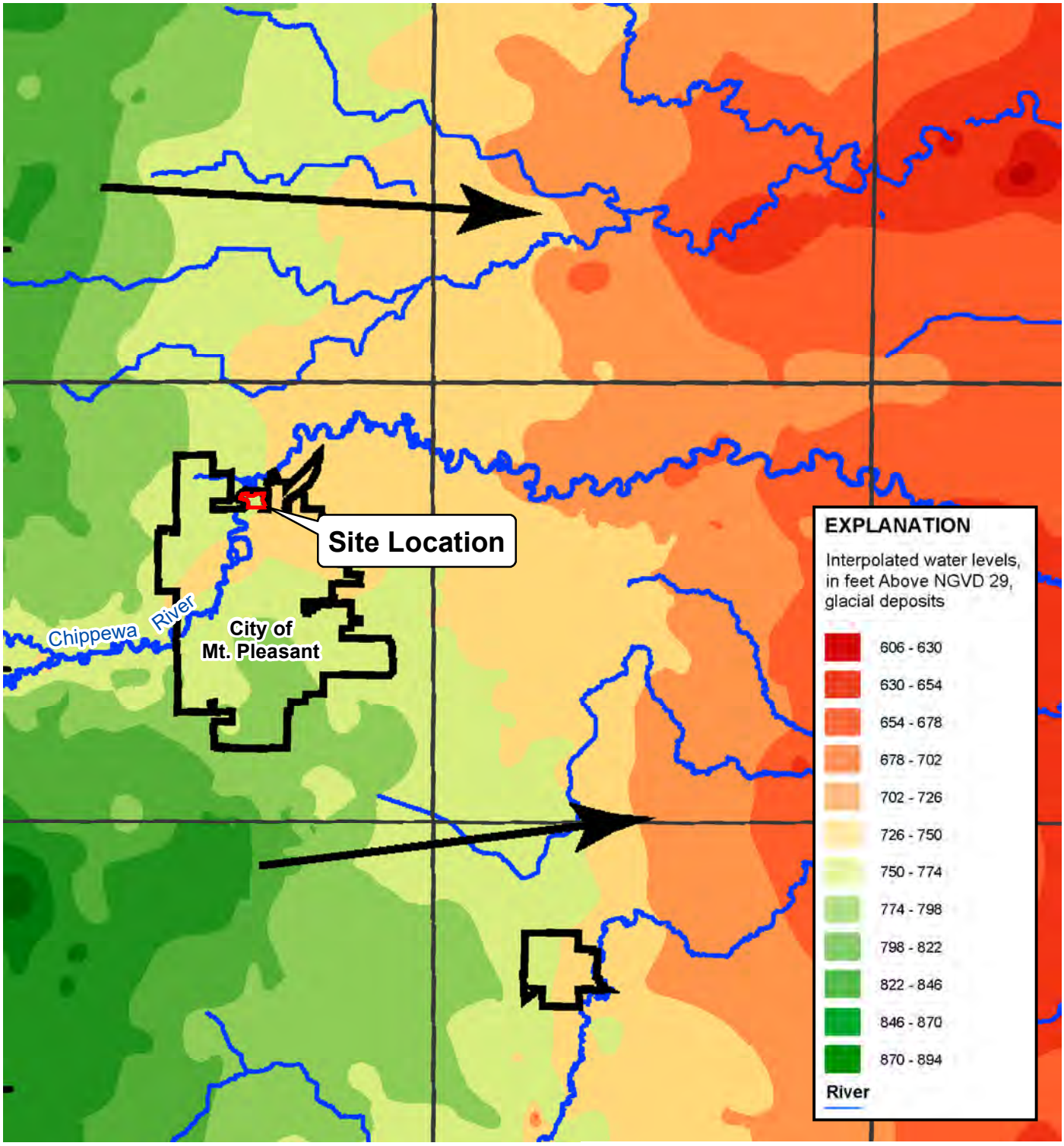

0 1 2 4

Miles

MSG

Notes:
1. Modified from Westjohn and Hoard, 2006.

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FIGURE 4

Regional Groundwater Flow Direction

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
11/30/2020	ZTR	ZTR	M3460001

Date Saved: 11/30/2020 4:54:08 PM
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Notes:
1. Site boundary adapted from parcel boundaries provided on the Isabella County website and AKTPeerless "Site Map" dated July 26, 2020.
2. Aerial imagery collected on November 18, 2020.
3. 2-inch diameter steel monitoring wells are believed to be wells installed by Keck in 1977.
4. Monitoring well MW-11-20 could not be located in the field.

Legend

- Geologic Profile Location and Orientation
- Soil Boring Location - MSG (May 2021)
- Soil Boring Location - MSG (April 2022)
- PVC Monitoring Well - MSG (Nov. 2020)
- PVC Monitoring Well -- MSG (April 2022)
- PVC Monitoring Well - AKT (2019-2020)
- Steel Monitoring Well - Keck (1977)
- Monitoring Well - Undocumented Origin
- Approximate Extent of Buried Refuse
- Site Boundary (Approximate)

0 200 400

Feet

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FIGURE 5

Geologic Profile Location Map

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
8/31/22	CJB	DJA	M3460003

Date Saved: 8/31/2022 10:30:21 AM
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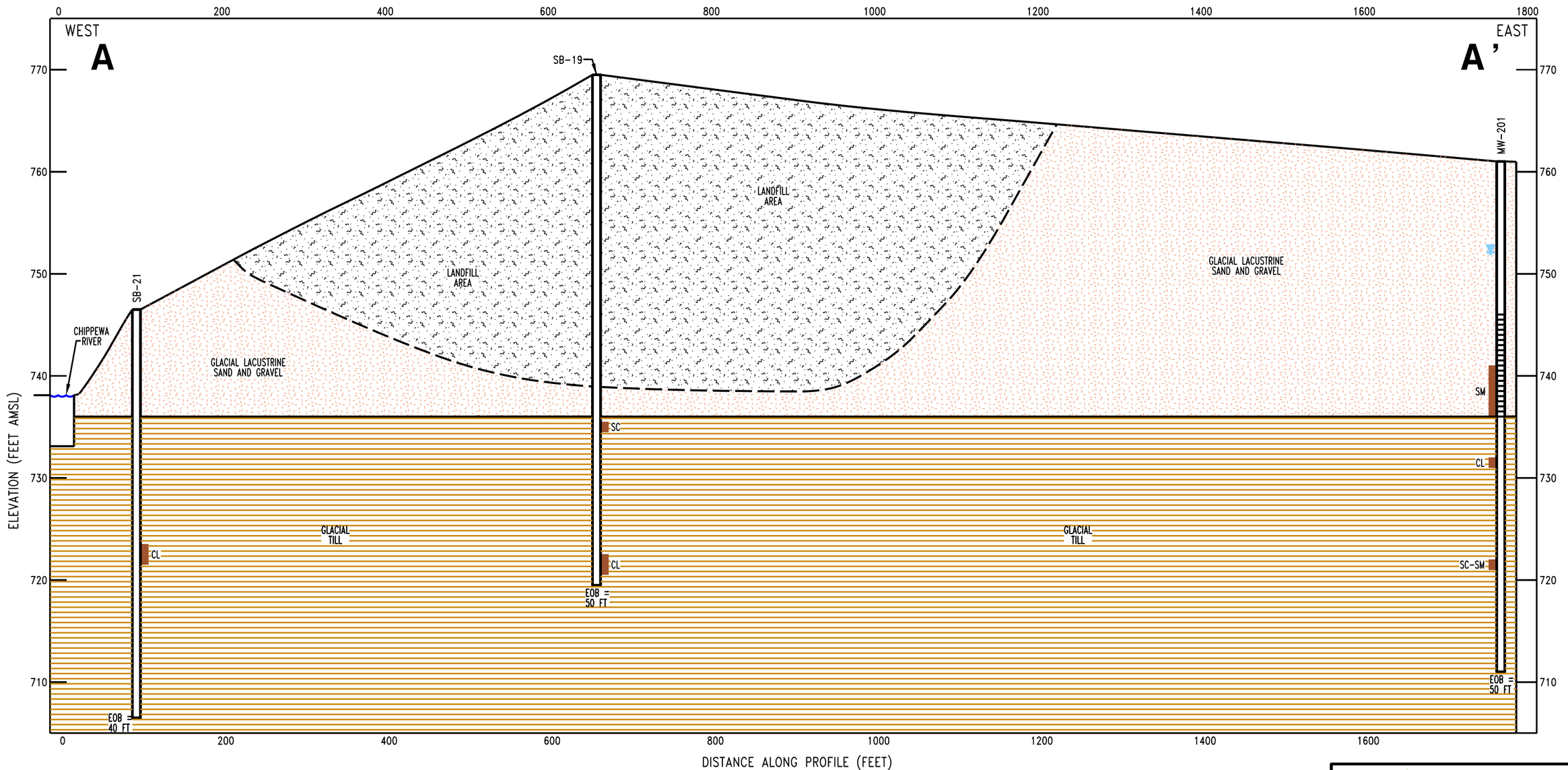
LEGEND:

- LANDFILL AREA: Buried Refuse, Sand, Clay, Wood and Construction Debris
- GLACIAL LACUSTRINE SAND AND GRAVEL: Silty Sand, Gravelly Sand and Sandy Gravel
- GLACIAL TILL: Silty-Sandy Clay, Clayey Sand and Hardpan
- 2-inch Diameter PVC Monitoring Well Screen
- Static Groundwater Elevation - May 16, 2022
- CL Soil Sample For Geotechnical Analyses and USCS Classification Symbol



NOTES:
1. THIS PROFILE IS GENERALIZED. SOIL CONTACTS BETWEEN BORINGS ARE INFERRED. REFER TO THE ORIGINAL SOIL BORING LOGS FOR MORE DETAILED INFORMATION.
2. SURFACE ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL.
3. EOB = END OF BORING.
4. THE LANDFILL AREA HAS A 2-FOOT THICK COMPACTED CLAY CAP (NOT SHOWN).
5. USCS = UNIFIED SOIL CLASSIFICATION SYSTEM

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FIGURE 6

GENERALIZED GEOLOGIC PROFILE A-A'

1301-1303 North Franklin Street
Mount Pleasant , Isabella County, Michigan

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
9/8/2022	CJB	DA	M3460003

9/8/2022 9:52:01 AM
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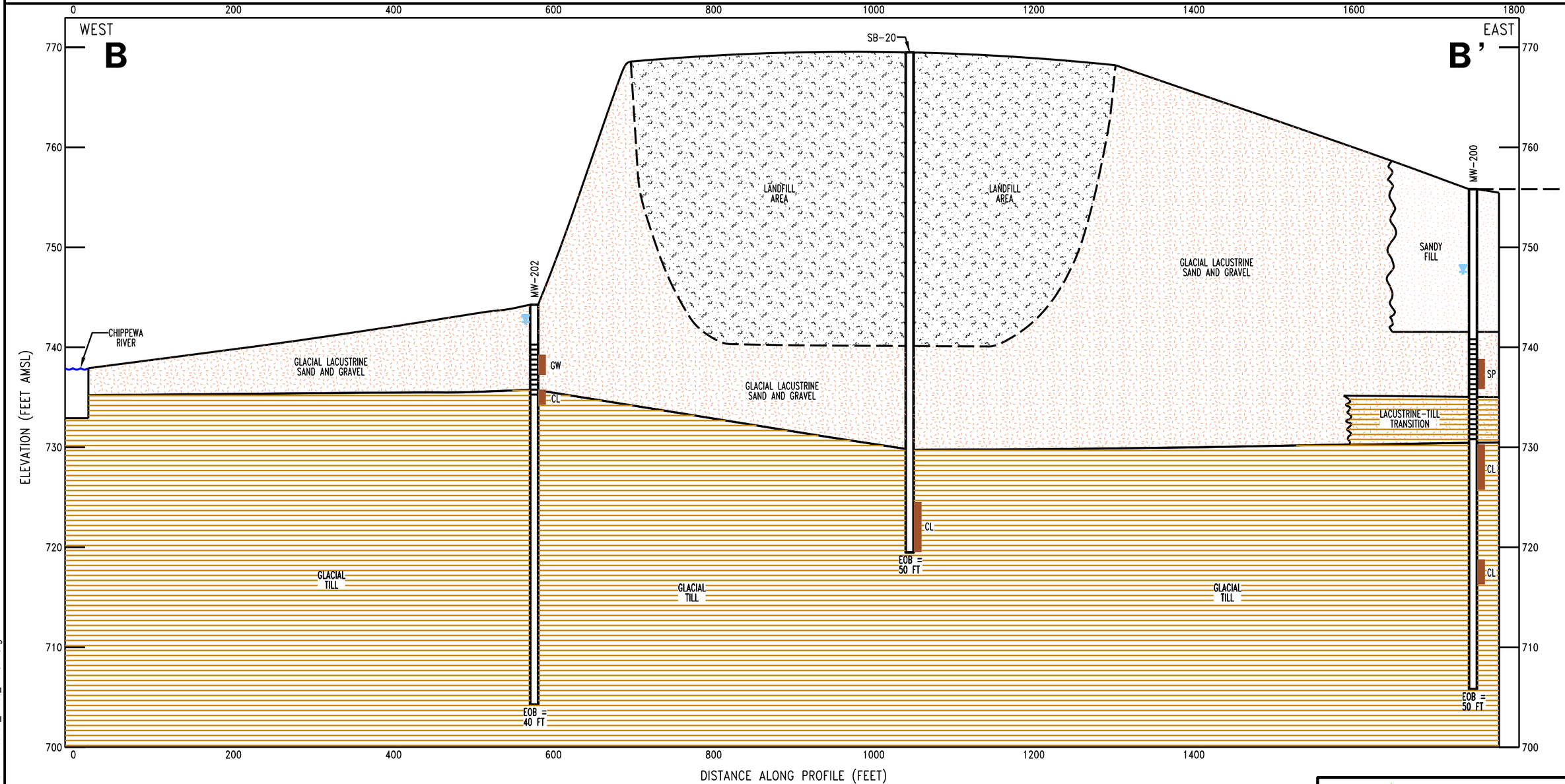
LEGEND:

- LANDFILL AREA: Buried Refuse, Sand, Clay, Wood and Construction Debris
- GLACIAL LACUSTRINE SAND AND GRAVEL: Silty Sand, Gravelly Sand and Sandy Gravel
- GLACIAL TILL: Silty-Sandy Clay, Clayey Sand and Hardpan
- LACUSTRNE-TILL TRANSITION: Sandy Silt
- SANDY SILT
- 2-inch Diameter PVC Monitoring Well Screen
- Static Groundwater Elevation - May 16, 2022
- CL Soil Sample For Geotechnical Analyses and USCS Classification Symbol



NOTES:
1. THIS PROFILE IS GENERALIZED. SOIL CONTACTS BETWEEN BORINGS ARE INFERRED. REFER TO THE ORIGINAL SOIL BORING LOGS FOR MORE DETAILED INFORMATION.
2. SURFACE ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL.
3. EOB = END OF BORING.
4. THE LANDFILL AREA HAS A 2-FOOT THICK COMPACTED CLAY CAP (NOT SHOWN).
5. USCS = UNIFIED SOIL CLASSIFICATION SYSTEM

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FIGURE 7

GENERALIZED GEOLOGIC PROFILE B-B'

1301-1303 North Franklin Street
Mount Pleasant , Isabella County, Michigan

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
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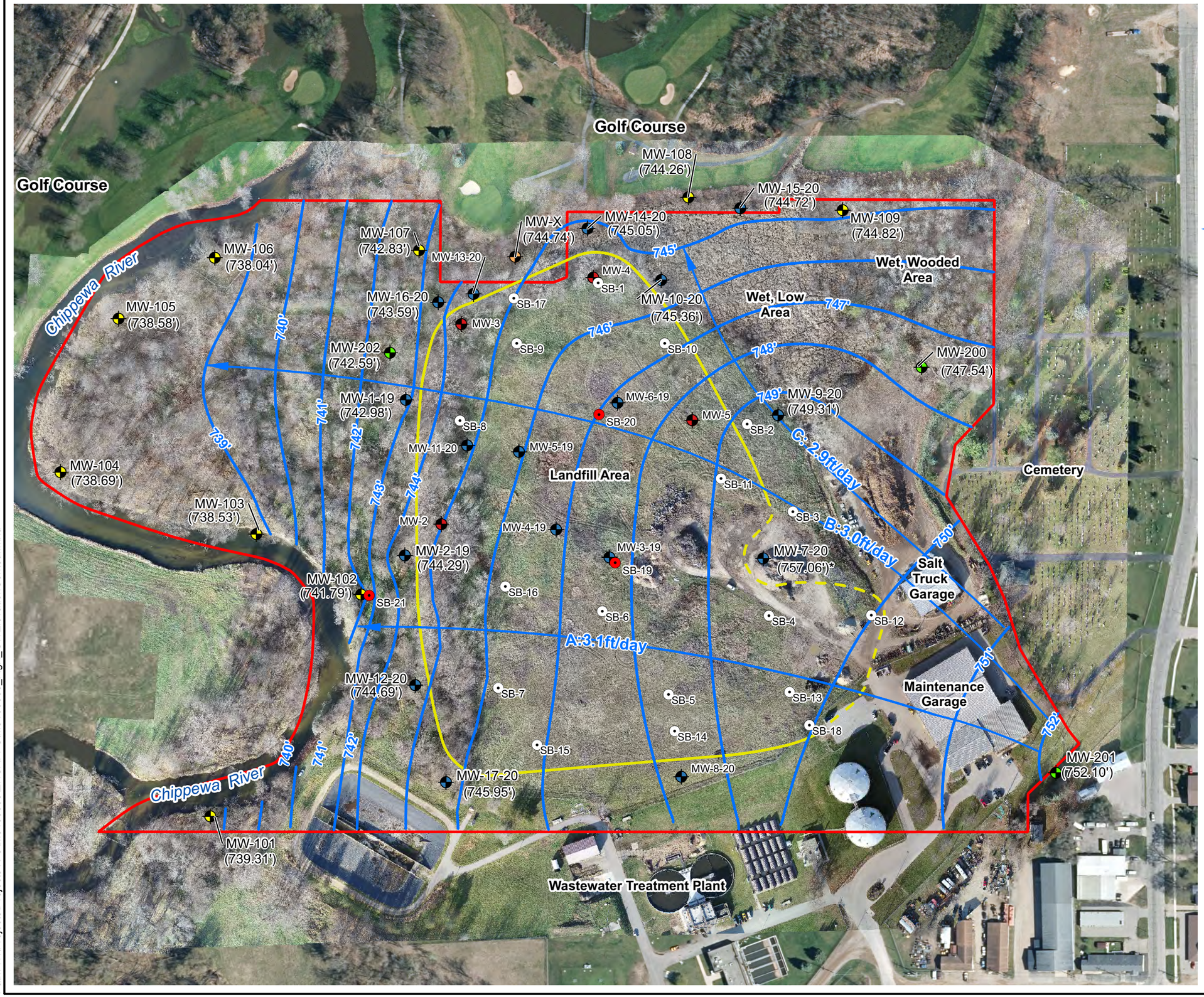

Legend

- Soil Boring Location - MSG (May 2021)
- Soil Boring Location - MSG (April 2022)
- PVC Monitoring Well - MSG (Nov. 2020)
- PVC Monitoring Well -- MSG (April 2022)
- PVC Monitoring Well - AKT (2019-2020)
- Steel Monitoring Well - Keck (1977)
- Monitoring Well - Undocumented Origin
- A: 2.1 ft/day — Groundwater Flow Path and Velocity
- Groundwater Elevation Contour (in feet)

* MW-7-20 not used for groundwater elevation contouring

- Approximate Extent of Buried Refuse
- Site Boundary (Approximate)

Notes:

1. Site boundary adapted from parcel boundaries provided on the Isabella County website and AKTPeerless "Site Map" dated July 26, 2020.

2. Site Aerial imagery collected on November 18, 2020 by the Mannik & Smith Group.

1 inch = 200 feet

0 200 400

Feet

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FIGURE 8

Groundwater Elevation Contour Map - May 16, 2022

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
9/6/2022	JRO	DJA	M3460003

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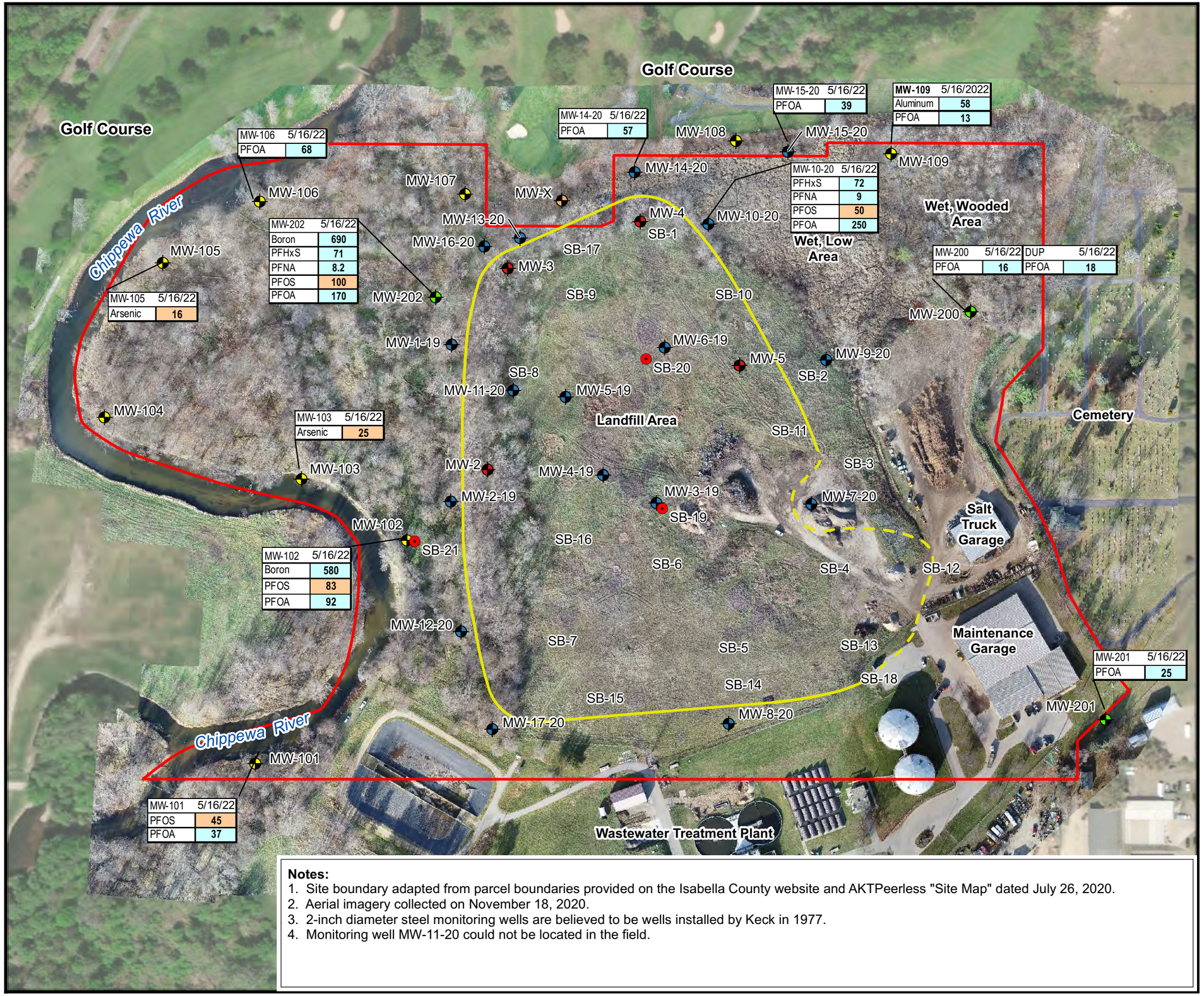

Notes:
1. Site boundary adapted from parcel boundaries provided on the Isabella County website and AKTPeerless "Site Map" dated July 26, 2020.
2. Aerial imagery collected on November 18, 2020.
3. 2-inch diameter steel monitoring wells are believed to be wells installed by Keck in 1977.
4. Monitoring well MW-11-20 could not be located in the field.

MSG

Legend

- Soil Boring Location - MSG (April 2022)
- PVC Monitoring Well - MSG (Nov. 2020)
- PVC Monitoring Well -- MSG (April 2022)
- PVC Monitoring Well - AKT (2019-2020)
- Steel Monitoring Well - Keck (1977)
- Monitoring Well - Undocumented Origin
- Approximate Extent of Buried Refuse
- Site Boundary (Approximate)

Exceeds Generic Drinking Water Criteria (DWC)
Exceeds Generic DWC and GSIC
Aluminum, Arsenic and Boron results expressed in µg/L
PFHxS, PFOS, PFNA, and PFOA results expressed in ng/L

0 200 400
Feet

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FIGURE 9

Groundwater Sample Criteria Exceedances - May 16, 2022

1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

DATE	DRAWN BY	DESIGNED BY	PROJECT NO.
9/6/2022	JRO	DJA	M3460003

Date Saved: 9/6/2022 2:03:15 PM
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TABLES

Table 1
Monitoring Well Information
Former Mt. Pleasant Landfill
Mt. Pleasant, Michigan

Well ID	Northing (US State Plane - 1988)	Easting (US State Plane - 1988)	Top of Casing Elevation (feet above msl)	Ground Surface Elevation (feet above msl)	Screen Length (feet)	Total Depth of Well from Ground Surface (feet)	Date	Depth to Water (from TOC)	Groundwater Elevation (feet)	Comments
MW-101	771233.3	13013986.4	743.07	739.6	4.5	4.5	11/23/2020	5.19	737.88	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	5.40	737.67	
							5/7/2021	5.22	737.85	
							5/16/2022	3.76	739.31	
MW-102	771701.2	13014294.6	748.66	746.3	5	7.0	11/23/2020	8.50	740.16	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	7.95	740.71	
							5/7/2021	8.11	740.55	
							5/16/2022	6.87	741.79	
MW-103	771835.9	13014079.0	740.53	738.6	2	4.5	11/23/2020	2.20	738.33	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	3.32	737.21	
							5/7/2021	3.11	737.42	
							5/16/2022	2.00	738.53	
MW-104	771953.6	13013657.9	744.48	741.2	3	4.5	11/23/2020	7.06	737.42	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	7.36	737.12	
							5/7/2021	7.20	737.28	
							5/16/2022	5.79	738.69	
MW-105	772287.1	13013780.9	743.52	739.4	3	4.0	11/23/2020	6.34	737.18	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	6.57	736.95	
							5/7/2021	6.43	737.09	
							5/16/2022	4.94	738.58	
MW-106	772407.6	13013987.7	744.25	740.5	5	6.0	11/23/2020	7.46	736.79	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	7.73	736.52	
							5/7/2021	7.50	736.75	
							5/16/2022	6.21	738.04	
MW-107	772432.6	13014416.2	747.85	745.9	5	8.0	11/23/2020	7.39	740.46	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	5.51	742.34	
							5/16/2022	5.02	742.83	
MW-108	772535.6	13014982.4	751.96	750.8	5	8.5	11/23/2020	8.34	743.62	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	7.94	744.02	
							5/7/2021	8.00	743.96	
							5/16/2022	7.70	744.26	
MW-109	772508.7	13015306.9	749.04	746.1	3.5	5.0	11/23/2020	4.65	744.39	1-inch diameter PVC well installed by MSG in November 2020
							4/27/2021	4.71	744.33	
							5/7/2021	4.63	744.41	
							5/16/2022	4.22	744.82	
MW-200	772179.7	13015473	759.04	756.0	10	25.0	5/16/2022	11.50	747.54	2-inch diameter PVC well installed by MSG in April 2022
MW-201	771328	13015755	764.12	761.1	10	25.0	5/16/2022	12.02	752.10	2-inch diameter PVC well installed by MSG in April 2022
MW-202	772211.3	13014355	746.85	744.2	5	9.0	5/16/2022	4.26	742.59	2-inch diameter PVC well installed by MSG in April 2022
MW-1-19	772110.0	13014388.0	749.74	745.4	10	7.0	4/27/2021	7.64	742.10	1-inch diameter PVC well installed by AKT in June 2019
							5/16/2022	6.76	742.98	
MW-2-19	771782.6	13014386.0	749.49	745.2	5	7.0	4/27/2021	6.34	743.15	1-inch diameter PVC well installed by AKT in June 2019
							5/16/2022	5.20	744.29	
MW-3-19	771778.7	13014817.0	773.77	771.5	5	12.4	4/27/2021	11.07	762.70	1-inch dimater PVC well installed by AKT in 2019 - no well log - well depth from field measurements
MW-4-19	771837.3	13014705.0	775.91	774.5	5	28.0	4/27/2021	16.60	759.31	1-inch diameter PVC well installed by AKT in June 2019
MW-5-19	772000.9	13014626.0	778.92	775.6	5	28.0	4/27/2021	22.40	756.52	1-inch diameter PVC well installed by AKT in December 2019
MW-6-19	772103.1	13014834.0	773.43	767.9	5	28.0	4/27/2021	14.00	759.43	1-inch diameter PVC well installed by AKT in December 2019
MW-7-20	771776.7	13015740.0	769.72	767.5	5	12.0	4/27/2021	13.51	756.21	1-inch diameter PVC well installed by AKT in February 2020
							5/16/2022	12.66	757.06	
MW-8-20	771318.1	13014967.0	770.60	765.4	5	28.0	4/27/2021	19.14	751.46	1-inch diameter PVC well installed by AKT in February 2020
MW-9-20	772077.1	13015171.0	755.90	753.9	5	12.0	4/27/2021	7.47	748.43	1-inch diameter PVC well installed by AKT in February 2020
							5/7/2021	7.88	748.02	
							5/16/2022	6.59	749.31	
MW-10-20	772361.2	13014925.0	750.65	746.7	5	12.0	4/27/2021	5.36	745.29	1-inch diameter PVC well installed by AKT in February 2020
							5/7/2021	5.38	745.27	
							5/16/2022	5.29	745.36	
MW-11-20	NF	NF	NF	NF	NF	NF	NF	NF	NF	1-inch diameter PVC well installed by AKT in February 2020. This well could not be located.
MW-12-20	771510.2	13014408.0	750.08	746.2	5	7.0	4/27/2021	6.50	6.50	1-inch diameter PVC well installed by AKT in February 2020
							5/16/2022	5.39	744.69	
MW-13-20	772332.5	13014531.0	749.32	745.6	5	7.0	11/23/2020	5.15	744.17	1-inch diameter PVC well installed by AKT in February 2020
							4/27/2021	6.09	743.23	
MW-14-20	772469.6	13014771.0	751.27	746.2	5	7.0	11/23/2020	7.00	744.27	PVC well installed by AKT in April 2020. 2-inch diameter PVC riser pipe visible at the ground surface
							4/27/2021	6.65	744.62	
							5/7/2021	6.67	744.60	
							5/16/2022	6.22	745.05	
MW-15-20	772512.5	13015091.0	749.73	745.5	5	7.0	11/23/2020	5.43	744.30	PVC well installed by AKT in April 2020. 2-inch diameter PVC riser pipe visible at the ground surface
							4/27/2021	5.22	744.51	
							5/7/2021	5.25	744.48	
							5/16/2022	5.01	744.72	
MW-16-20	772314.9	13014456.0	750.11	746.3	5	7.0	11/23/2020	7.22	742.89	1-inch diameter PVC well installed by AKT in April 2020
							4/27/2021	7.07	743.04	
							5/16/2022	6.52	743.59	
MW-17-20	771306.4	13014473.0	753.24	752.7	5	7.0	4/27/2021	8.99	744.25	1-inch diameter PVC well installed by AKT in April 2020
							5/16/2022	7.29	745.95	
MW-X	772410.2	13014619.0	749.48	746.1	ND	6.4	4/27/2021	4.87	744.61	1-inch diamater PVC well of undocumented origin - no well log - well depth from field measurements
							5/16/2022	4.74	744.74	

Notes:
NF = Well could not be located
TOC = Feet from Top of Casing.
msl = Mean Sea Level

Table 2
Groundwater Sample Analytical Data - Residential Criteria
1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

GROUNDWATER: Part 201 Generic Residential Cleanup Criteria December 21, 2020 Units: micrograms/liter (µg/L)		Detected Volatile Organic Compounds (VOCs)		Detected Semi-Volatile Organic Compounds (SVOCs)	Detected Metals (Dissolved)					Detected PFAS Compounds (ng/L)											
		Acetone	Chlorobenzene (l)	Benzaldehyde	Aluminum	Arsenic	Barium	Boron	Copper (B)	Nickel (B)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorobutanoic Acid (PFBA)	Perfluoroheptanesulfonic Acid (PFHpS)	Perfluoroheptanoic Acid (PFHpA)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluorohexanoic Acid (PFHxA)	Perfluorononanoic Acid (PFNA)	Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluoropentanesulfonic Acid (PFPeS)	Perfluoropentanoic Acid (PFPeA)
CAS Number		67-64-1	108907	100-52-7	7429-90-5	7440-38-2	7440-39-3	7440-42-8	7440-50-8	7440020	375-73-5	375-22-4	375-92-8	375-85-9	355-46-4	307-24-4	375-95-1	1763-23-1	335-67-1	2706-91-4	2706-90-3
Drinking Water Criteria		730	100 (A)	NA	50(V)	10 (A)	2,000 (A)	500(F)	1,000 (E)	100 (A)	420	NA	NA	NA	51	400,000	6(A)	16(A)	8(A)	NA	NA
Groundwater Surface Water Interface Criteria (GSI)		1,700	25	NA	NA	10	670 (G)	7,200(X)	13 (G)	73	NA	NA	NA	NA	NA	NA	NA	12(X)	12,000(X)	NA	NA
Groundwater Volatilization to Indoor Air Inhalation Criteria		1.0E+09 (D,S)	2.10E+05	NA	NLV	NLV	NLV	NLV	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	NLV	ID	NA	NA
Water Solubility		1.0E+09	4.7E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3100	9.50E+09	NA	NA
Flammability & Explosivity Screening Level		1.5E+07	1.6E+05	NA	ID	ID	ID	ID	ID	ID	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SAMPLE ID	SAMPLE DATE																				
MW-101	11/23/2020	<10	<1.0	<1.0	<10	<5.0	75	240	<5.0	ND	<4.8	6.2	<4.8	7.2	45	5.2	<4.8	28	28	6.1	<4.8
MW-101	5/7/2021	<10	<1.0	<1.0	<10	<5.0	92	280	<5.0	ND	<4.8	<4.8	<4.8	<4.8	24	<4.8	<4.8	26	11	<4.8	<4.8
MW-101	5/16/2022	<10	<1.0	<4.0	15	<5.0	97	300	<5.0	ND	6.5	15	<4.8	8.6	51	8.2	<4.8	45	37	<4.8	5.8
MW-102	11/23/2020	<10	<1.0	<1.0	<10	<5.0	170	650	<5.0	ND	14	27	6.5	48	60	46	<5.1	56	120	31	25
MW-102	5/7/2021	25	<1.0	<1.0	11	<5.0	140	730	<5.0	ND	26	20	<4.9	22	35	29	<4.9	53	60	23	12
MW-102	5/16/2022	<20	<1.0	<4.0	<10	5.4	180	580	<5.0	ND	27	31	6.0	32	50	38	<4.8	83	92	31	15
MW-103	11/23/2020	<10	<1.0	<1.0	12	30	38	150	<5.0	ND	6.2	30	<4.5	6.4	<4.5	13	<4.5	<1.8	3.4	<4.5	4.9
MW-103	5/7/2021	<10	<1.0	<1.0	38	33	41	160	<5.0	ND	7.1	36	<4.7	6.6	<4.7	16	<4.7	<1.9	3.8	<4.7	5.0
MW-103	5/16/2022	<10	<1.0	<3.8	<10	25	57	160	<5.0	ND	7.3	40	<4.9	6.9	<4.9	19	<4.9	<1.9	4.8	<4.9	7.2
MW-104	11/23/2020	<10	<1.0	<1.0	<10	<5.0	70	22	<5.0	ND	<4.6	16	<4.6	<4.6	<4.6	<4.6	<4.6	2.5	3.4	<4.6	<4.6
DUP-1 (MW-104)	11/23/2020	<10	<1.0	<1.0	<10	<5.0	53	23	<5.0	ND	<4.6	12	<4.6	<4.6	<4.6	<4.6	<4.6	<1.9	2.3	<4.6	<4.6
MW-104	5/7/2021	<10	<1.0	<1.0	<10	<5.0	76	25	<5.0	ND	<5.1	5.4	<5.1	<5.1	<5.1	<5.1	<5.1	<2.0	<2.0	<5.1	<5.1
MW-104	5/16/2022	<10	<1.0	<4.1	29	<5.0	86	25	<5.0	ND	<4.9	13	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9
MW-105	11/23/2020	11	<1.0	2.2	25	44	190	22	<5.0	ND	7.2	69	<5.0	5.6	<5.0	9.9	<5.0	<2.0	6.5	<5.0	17
MW-105	5/7/2021	<10	<1.0	<1.0	<10	47	160	<20	<5.0	ND	<5.5	27	<5.5	<5.5	<5.5	<5.5	<5.5	<2.2	2.8	<5.5	<5.5
MW-105	5/16/2022	<10	<1.0	<3.9	<10	16	140	28	<5	ND	11	65	<4.8	<4.8	<4.8	5.3	<4.8	<4.8	5.8	<4.8	11
MW-106	11/23/2020	<10	<1.0	<1.0	<10	<5.0	54	280	<5.0	ND	11	67	<4.8	13	13	14	<4.8	6.5	26	12	4.8
MW-106	5/7/2021	<10	<1.0	<1.0	38	<5.0	85	380	<5.0	ND	17	96	<4.6	18	26	14	<4.6	14	67	13	5.0
MW-106	5/16/2022	<10	<1.0	<3.7	11	<5	74	420	<5.0	ND	35	270	<5	25	29	28	<5	12	68	18	11.0
MW-107	11/23/2020	<10	<1.0	<1.0	<10	<5.0	79	220	<5.0	ND	11	11	<4.6	10	26	7.1	<4.6	13	31	16	<4.6
MW-108	11/23/2020	<10	<1.0	<1.0	13	<5.0	230	190	<5.0	ND	8.4	11	<4.7	7.4	25	8.4	<4.7	5.5	14	7.0	5.8
MW-108	5/7/2021	<10	<1.0	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-109	11/23/2020	<10	<1.0	<1.0	<10	<5.0	240	93	<5.0	ND	6.4	11	<4.5	<4.5	11	<4.5	<4.5	3.8	15	<4.5	<4.5
MW-109	5/7/2021	<10	<1.0	<1.0	19	<5.0	150	100	<5.0	ND	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	2.5	6	<5.1	<5.1
MW-109	5/16/2022	<10	<1.0	<3.6	58	<5.0	190	130	<5.0	<5.0	5.8	30	<4.9	<4.9	6.4	<4.9	<4.9	5.8	13	<4.9	<4.9
MW- 200	5/16/2022	<10	<1.0	<3.9	32	9.6	300	110	<5.0	ND	6.1	9	<4.6	5	15	<4.6	<4.6	3.2	16	<4.6	<4.6
DUP (MW- 200)	5/16/2022	<10	<1.0	<3.8	34	10	290	110	<5.0	<5.0	5.8	8.1	<4.7	<4.7	15	5.4	<4.7	<4.7	18	5.7	<4.7
MW- 201	5/16/2022	<10	<1.0	<3.8	<10	<5.0	120	88	<5.0	ND	17	10	<4.9	7.4	19	5.4	<4.9	<4.9	25	5.8	<4.9
MW- 202	5/16/2022	<10	6.1	<3.7	15	<5.0	380	690	<5.0	5.6	22	470	7.5	45	71	38	8.2	100	170	19	12
MW-9-20	5/7/2021	<10	<1.0	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-10-20	5/7/2021	<10	<1.0	<1.0	120	<5.0	340	580	<5.0	ND	15	25	<4.9	28	51	25	5.2	46	100	14	14
DUP-1 (MW-10-20)	5/7/2021	<10	<1.0	<1.0	240	<5.0	340	570	<5.0	ND	14	26	<4.6	29	59	25	5.2	45	99	15	13
MW-10-20	5/16/2022	<10	<1.0	<3.9	46	<5.0	270	460	<5.0	<5.0	13	44	7	51	72	37	9	50	250	20	22
MW-13-20	11/23/2020	NS	NS	<1.0	<10	<5.0	140	280	<5.0	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14-20	11/23/2020	NS	NS	<1.0	12	<5.0	120	230	<5.0	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14-20	5/7/2021	<10	<1.0	<1.0	160	<5.0	97	110	<5.0	ND	8.2	16	<5.2	9.5	26	13	<5.2	12	27	6.2	7.2
MW-14-20	5/16/2022	<10	<1.0	<4.2	29	<5.0	140	110	<5.0	<5.0	7.2	30	<5.2	16	28	13	<5.2	11	57	6.5	10
MW-15-20	11/23/2020	NS	NS	<1.0	<10	<5.0	250	160	5.2	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-15-20	5/7/2021	<10	<1.0	<1.0	210	<5.0	250	130	<5.0	ND	7.6	11	<4.9	6.7	18	8.9	<4.9	6.5	10	<4.9	5.8
MW-15-20	5/16/2022	<10	<1.0	<3.8	19	<5.0	180	94	<5.0	<5.0	9.3	40	<4.7	12	32	13	<4.9	7.1	39	5.5	17
MW-16-20	11/23/2020	NS	NS	<1.0	49	<5.0	540	800	<5.0	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
Bold indicates concentration reported at or above laboratory reporting limit.
Exceeds Generic Drinking Water Criteria (DW)
Exceeds Generic Groundwater Surface Water Interface Criteria (GSI)
Exceeds DW and GSI
ND = Not Detected at or above laboratory reporting limit
NS = Not Sampled or Not Analyzed
NA = No Criteria Established
ng/L= Nanograms per liter
ID= Insufficient data to develop criterion
NLV= Not likely to volatilize under most conditions
PCBs were not detected in the Nov. 2020, May 2021, or May 2022 groundwater samples analyzed for PCBs.
The GSI values for Barium, Copper, and Nickle were calculated using the EGLE spreadsheet for calculating GSI cleanup criteria. The values presented are for surface water bodies protected as a drinking water source. A water hardness value of 150 milligrams per liter as CaCo3 was used for the calculations.
Notes in parentheses and standard abbreviations from EGLE Part 201 Resource Materials Table 1. Groundwater: Residential and Non Residential Part 201 Generic Cleanup Criteria and Screening Levels (December 21, 2020) and R299.49. Footnotes for Generic Cleaup Criteria Tables (December 21, 2020)

Table 3
Groundwater Sample Analytical Data- Nonresidential Criteria
1301-1303 North Franklin Street
Mount Pleasant, Isabella County, MI

GROUNDWATER: Part 201 Generic Nonresidential Cleanup Criteria December 21, 2020 Units: micrograms/liter (µg/L)		Detected Volatile Organic Compounds (VOCs)		Detected Semi-Volatile Organic Compounds (SVOCs)	Detected Metals (Dissolved)						Detected PFAS Compounds (ng/L)										
		Acetone	Chlorobenzene (l)	Benzaldehyde	Aluminum	Arsenic	Barium	Boron	Copper (B)	Nickel (B)	Perfluorobutanesulfonic Acid (PFBS)	Perfluorobutanoic Acid (PFBA)	Perfluoroheptanesulfonic Acid (PFHpS)	Perfluoroheptanoic Acid (PFHpA)	Perfluorohexanesulfonic Acid (PFHxS)	Perfluorohexanoic Acid (PFHxA)	Perfluorononanoic Acid (PFNA)	Perfluorooctanesulfonic Acid (PFOS)	Perfluorooctanoic Acid (PFOA)	Perfluoropentanesulfonic Acid (PFPeS)	Perfluoropentanoic Acid (PFPeA)
CAS Number		67-64-1	108907	100-52-7	7429-90-5	7440-38-2	7440-39-3	7440-42-8	7440-50-8	7440020	375-73-5	375-22-4	375-92-8	375-85-9	355-46-4	307-24-4	375-95-1	1763-23-1	335-67-1	2706-91-4	2706-90-3
Drinking Water Criteria		2100	100 (A)	NA	50(V)	10 (A)	2,000 (A)	500(F)	1,000 (E)	100 (A)	420	NA	NA	NA	51	400,000	6(A)	16(A)	8(A)	NA	NA
Groundwater Surface Water Interface Criteria (GSI)		1,700	25	NA	NA	10	670 (G)	7,200(X)	13 (G)	73	NA	NA	NA	NA	NA	NA	NA	12(X)	12,000(X)	NA	NA
Groundwater Volatilization to Indoor Air Inhalation Criteria		1.0E+09 (D,S)	4.7E+5 (S)	NA	NLV	NLV	NLV	NLV	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	NLV	ID	NA	NA
Water Solubility		1.0E+09	4.7E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3100	9.50E+09	NA	NA
Flammability & Explosivity Screening Level		1.5E+07	1.6E+05	NA	ID	ID	ID	ID	ID	ID	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SAMPLE ID	SAMPLE DATE																				
MW-101	11/23/2020	<10	<1.0	<1.0	<10	<5.0	75	240	<5.0	ND	<4.8	6.2	<4.8	7.2	45	5.2	<4.8	28	28	6.1	<4.8
MW-101	5/7/2021	<10	<1.0	<1.0	<10	<5.0	92	280	<5.0	ND	<4.8	<4.8	<4.8	<4.8	24	<4.8	<4.8	26	11	<4.8	<4.8
MW-101	5/16/2022	<10	<1.0	<4.0	15	<5.0	97	300	<5.0	ND	6.5	15	<4.8	8.6	51	8.2	<4.8	45	37	<4.8	5.8
MW-102	11/23/2020	<10	<1.0	<1.0	<10	<5.0	170	650	<5.0	ND	14	27	6.5	48	60	46	<5.1	56	120	31	25
MW-102	5/7/2021	25	<1.0	<1.0	11	<5.0	140	730	<5.0	ND	26	20	<4.9	22	35	29	<4.9	53	60	23	12
MW-102	5/16/2022	<20	<1.0	<4.0	<10	5.4	180	580	<5.0	ND	27	31	6.0	32	50	38	<4.8	83	92	31	15
MW-103	11/23/2020	<10	<1.0	<1.0	12	30	38	150	<5.0	ND	6.2	30	<4.5	6.4	<4.5	13	<4.5	<1.8	3.4	<4.5	4.9
MW-103	5/7/2021	<10	<1.0	<1.0	38	33	41	160	<5.0	ND	7.1	36	<4.7	6.6	<4.7	16	<4.7	<1.9	3.8	<4.7	5.0
MW-103	5/16/2022	<10	<1.0	<3.8	<10	25	57	160	<5.0	ND	7.3	40	<4.9	6.9	<4.9	19	<4.9	<1.9	4.8	<4.9	7.2
MW-104	11/23/2020	<10	<1.0	<1.0	<10	<5.0	70	22	<5.0	ND	<4.6	16	<4.6	<4.6	<4.6	<4.6	<4.6	2.5	3.4	<4.6	<4.6
DUP-1 (MW-104)	11/23/2020	<10	<1.0	<1.0	<10	<5.0	53	23	<5.0	ND	<4.6	12	<4.6	<4.6	<4.6	<4.6	<4.6	<1.9	2.3	<4.6	<4.6
MW-104	5/7/2021	<10	<1.0	<1.0	<10	<5.0	76	25	<5.0	ND	<5.1	5.4	<5.1	<5.1	<5.1	<5.1	<5.1	<2.0	<2.0	<5.1	<5.1
MW-104	5/16/2022	<10	<1.0	<4.1	29	<5.0	86	25	<5.0	ND	<4.9	13.0	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9	<4.9
MW-105	11/23/2020	11	<1.0	2.2	25	44	190	22	<5.0	ND	7.2	69	<5.0	5.6	<5.0	9.9	<5.0	<2.0	6.5	<5.0	17
MW-105	5/7/2021	<10	<1.0	<1.0	<10	47	160	<20	<5.0	ND	<5.5	27	<5.5	<5.5	<5.5	<5.5	<5.5	<2.2	2.8	<5.5	<5.5
MW-105	5/16/2022	<10	<1.0	<3.9	<10	16	140	28	<5	ND	11	65	<4.8	<4.8	<4.8	5.3	<4.8	<4.8	5.8	<4.8	11
MW-106	11/23/2020	<10	<1.0	<1.0	<10	<5.0	54	280	<5.0	ND	11	67	<4.8	13	13	14	<4.8	6.5	26	12	4.8
MW-106	5/7/2021	<10	<1.0	<1.0	38	<5.0	85	380	<5.0	ND	17	96	<4.6	18	26	14	<4.6	14	67	13	5.0
MW-106	5/16/2022	<10	<1.0	<3.7	11	<5	74	420	<5.0	ND	35	270	<5	25	29	28	<5	12	68	18	11.0
MW-107	11/23/2020	<10	<1.0	<1.0	<10	<5.0	79	220	<5.0	ND	11	11	<4.6	10	26	7.1	<4.6	13	31	16	<4.6
MW-108	11/23/2020	<10	<1.0	<1.0	13	<5.0	230	190	<5.0	ND	8.4	11	<4.7	7.4	25	8.4	<4.7	5.5	14	7.0	5.8
MW-108	5/7/2021	<10	<1.0	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-109	11/23/2020	<10	<1.0	<1.0	<10	<5.0	240	93	<5.0	ND	6.4	11	<4.5	<4.5	11	<4.5	<4.5	3.8	15	<4.5	<4.5
MW-109	5/7/2021	<10	<1.0	<1.0	19	<5.0	150	100	<5.0	ND	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	<5.1	2.5	6	<5.1	<5.1
MW-109	5/16/2022	<10	<1.0	<3.6	58	<5.0	190	130	<5.0	<5.0	5.8	30	<4.9	<4.9	6.4	<4.9	<4.9	5.8	13	<4.9	<4.9
MW- 200	5/16/2022	<10	<1.0	<3.9	32	9.6	300	110	<5.0	ND	6.1	9	<4.6	5	15	<4.6	<4.6	3.2	16	<4.6	<4.6
DUP (MW- 200)	5/16/2022	<10	<1.0	<3.8	34	9.8	290	110	<5.0	<5.0	5.8	8.1	<4.7	<4.7	15	5.4	<4.7	<4.7	18	5.7	<4.7
MW- 201	5/16/2022	<10	<1.0	<3.8	<10	<5.0	120	88	<5.0	ND	17	10	<4.9	7.4	19	5.4	<4.9	<4.9	25	5.8	<4.9
MW- 202	5/16/2022	<10	6.1	<3.7	15	<5.0	380	690	<5.0	5.6	22	470	7.5	45	71	38	8.2	100	170	19	12
MW-9-20	5/7/2021	<10	<1.0	NS	NS	NS	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-10-20	5/7/2021	<10	<1.0	<1.0	120	<5.0	340	580	<5.0	ND	15	25	<4.9	28	51	25	5.2	46	100	14	14
DUP-1 (MW-10-20)	5/7/2021	<10	<1.0	<1.0	240	<5.0	340	570	<5.0	ND	14	26	<4.6	29	59	25	5.2	45	99	15	13
MW-10-20	5/16/2022	<10	<1.0	<3.9	46	<5.0	270	460	<5.0	<5.0	13	44	7	51	72	37	9	50	250	20	22
MW-13-20	11/23/2020	NS	NS	<1.0	<10	<5.0	140	280	<5.0	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14-20	11/23/2020	NS	NS	<1.0	12	<5.0	120	230	<5.0	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-14-20	5/7/2021	<10	<1.0	<1.0	160	<5.0	97	110	<5.0	ND	8.2	16	<5.2	9.5	26	13	<5.2	12	27	6.2	7.2
MW-14-20	5/16/2022	<10	<1.0	<4.2	29	<5.0	140	110	<5.0	<5.0	7.2	30	<5.2	16	28	13	<5.2	11	57	6.5	10
MW-15-20	11/23/2020	NS	NS	<1.0	<10	<5.0	250	160	5.2	ND	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-15-20	5/7/2021	<10	<1.0	<1.0	210	<5.0	250	130	<5.0	ND	7.6	11	<4.9	6.7	18	8.9	<4.9	6.5	10	<4.9	5.8
MW-15-20	5/16/2022	<10	<1.0	<3.8	19	<5.0	180	94	<5.0	<5.0	9.3	40	<4.7	12	32	13	<7.0	7.1	39	5.5	17
MW-16-20	11/23/2020	NS	NS	<1.0	49	<5.0	540	800	<5.0	<5.0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
Bold indicates concentration reported at or above laboratory reporting limit.
Exceeds Generic Drinking Water Criteria (DW)
Exceeds Generic Groundwater Surface Water Interface Criteria (GSI)
Exceeds Applicable Groundwater Vapor Intrusion screening levels
Exceeds GSI Final Acute Value (FAV), also exceeds others
NS = Not Sampled or Not Analyzed
NA = No Criteria Established
ng/L= Nanograms per liter
ID= Insufficient data to develop criterion
NLV= Not likely to volatilize under most conditions
PCBs were not detected in the Nov. 2020, May 2021, or May 2022 groundwater samples analyzed for PCBs.
The GSI values for Barium, Copper and Nickle were calculated using the EGLE spreadsheet for calculating GSI cleanup criteria. The values presented are for surface water bodies protected as a drinking water source. A water hardness value of 150 milligrams per liter as CaCo3 was used for the calculations.
Notes in parentheses and standard abbreviations from EGLE Part 201 Resource Materials Table 1. Groundwater: Residential and Non Residential Part 201 Generic Cleanup Criteria and Screening Levels (December 21, 2020) and R299.49 Footnotes for Generic Cleaup Criteria Tables (December 21, 2020)
Dissolved Nickle was detected in the groundwater sample collected from MW-202 on May 16th 2022

Table 4
Groundwater Flow Velocity Calculations - May 16, 2022
Former Mt. Pleasant Landfill - Mt. Pleasant, Michigan

Date	Flow Path	Dh (ft)	Dl (ft)	Hydraulic Gradient Dh/ Dl	Average Conductivity, K (ft/day)	Estimated Effective Porosity, n	Calculated Groundwater Flow Velocity (ft/day)
May 16, 2022	A	10.0	1460	0.0068	137.2	0.3	3.1
May 16, 2022	B	13.0	1980	0.0066	137.2	0.3	3.0
May 16, 2022	C	7.0	1120	0.0063	137.2	0.3	2.9

Notes:

1. Hydraulic Conductivity (K) based on site-specific grain size distribution test data
2. Dh = Change in groundwater elevation (measured along the groundwater flow paths identified on Figure 8).
3. Dl = Lateral distance along flow path (measured along the flow groundwater paths identified on Figure 8).
4. Velocity = (Dh/Dl) K / n
5. Static groundwater levels measaured by MSG personnel on May 16, 2022

APPENDIX A
PHOTO LOG

Boart Longyear LS 250 Minisonic Drill Rig (4/11/2022).

Rotosonic drilling potable water supply at Mt. Pleasant vehicle maintenance garage (4/11/2022).

Rotosonic drilling at MW-201 (4/11/2022).

Contact of gravelly lacustrine sand (right) and fine grained lacustrine sand (left) at 8 feet bgs at MW-201 (4/11/2022).

Contact of gravelly lacustrine sand (left) and fine grained lacustrine sand (right) at 8 feet bgs at MW-201 (4/11/2022).

Drilling and retrieving soil core at MW-201 (4/11/2022).

Till clay from 25-30 feet bgs at MW-201 (4/11/2022).

Till clay from 25-30 feet bgs at MW-201 (4/11/2022).

Till clay from 25-30 feet bgs at MW-201 (4/11/2022).

Soil cores from 0-30 feet bgs at MW-201 (4/11/2022). Zero feet bgs is at top right. 30 feet bgs is at bottom left.

Hardpan-like till clay at 35 feet bgs at MW-201 (4/11/2022).

Hardpan-like till clay at 40 feet bgs at MW-201 (4/11/2022).

Hardpan-like till clay at 40 feet bgs at MW-201 (4/11/2022).

Hardpan-like till clay at 40 feet bgs at MW-201 (4/11/2022).

25-30 feet bgs (top) and 35-40 feet bgs (bottom) till clay soil cores from MW-201 (4/11/2022).

Till clay from 42-50 feet bgs at MW-201 (4/11/2022).

30-35 feet bgs (top) and 40-45 feet bgs (bottom) till clay soil cores from MW-201 (4/11/2022).

MW-200 location prior to drilling (4/12/2022).

Lacustrine sand from 15.5-20 feet bgs at MW-200 (4/12/2022).

Rotosonic drilling and soil core retrieval at MW-200 (4/12/2022).

Till clay from 25.5-30 feet bgs at MW-200 (4/12/2022).

Soil core retrieval at MW-200 (4/12/2022).

Hardpan-like till clay from 33-35 feet bgs at MW-200 (4/12/2022).

Hardpan-like till clay from 35-39.5 feet bgs at MW-200 (4/12/2022).

Hardpan-like till clay from 35-39.5 feet bgs at MW-200 (4/12/2022).

Hardpan-like till clay from 35-39.5 feet bgs at MW-200 (4/12/2022).

Till clay from 40-45 feet bgs at MW-200 (4/12/2022).

Hardpan-like till clay from 47-50 feet bgs at MW-200 (4/12/2022).

SB-20 boring location prior to drilling (4/12/2022).

Clay cap (right) and top of refuse (left) at 1.5-3 feet bgs at SB-20 (4/12/2022).

Refuse from 5-10 feet bgs at SB-20 (4/12/2022).

Base of refuse and top of lacustrine sand at 29-30 feet bgs at SB-20 (4/12/2022).

Lacustrine sand at 38 feet bgs at SB-20(4/12/2022).

Very hard till clay from 40-44.5 feet bgs at SB-20 (4/12/2022).

Hardpan-like till clay from 45-50 feet bgs at SB-20 (4/12/2022).

Hardpan-like till clay from 45-50 feet bgs at SB-20 (4/12/2022).

Setting up the rotosonic drill rig at the SB-19 boring location (4/12/2022).

Clay cap (right) and top of refuse (left) from 1.5-2.5 feet bgs at SB-19 (4/12/2022).

Refuse and wood from 5-10 feet bgs at SB-19 (4/12/2022).

Fill sand and underlying refuse from 17-20 feet bgs at SB-19 (4/12/2022).

Refuse from 10-15 feet bgs at SB-19 (4/12/2022).

Lacustrine gravelly sand from 30-32 feet bgs at SB-19 (4/12/2022).

Lacustrine gravelly sand/very hard till clay contact at 33.5 feet bgs at SB-19 (4/12/2022).

Very hard till clay from 35-40 feet bgs at SB-19 (4/12/2022).

Very hard till clayey sand-sandy clay from 35-40 feet bgs at SB-19 (4/12/2022).

Very hard till clay from 40-50 feet bgs at SB-19 (4/12/2022).

Very hard till clay from 40-50 feet bgs at SB-19 (4/12/2022).

Very hard till clay from 40-50 feet bgs at SB-19 (4/12/2022).

Very hard till clay from 40-50 feet bgs at SB-19 (4/12/2022).

Tracking through woods to MW-202 location (4/12/2022).

Tracking through woods to MW-202 location (4/12/2022).

Drilling at MW-202 location (4/12/2022).

Lacustrine sandy gravel from 5-7.7 feet bgs at MW-202 (4/12/2022).

Contact of lacustrine sandy gravel (left) and clayey silt (right) at 7.7 feet bgs at MW-202 (4/12/2022).

Very hard till clay from 8.5-10 feet bgs at MW-202 (4/12/2022).

Very hard till clay from 10-15 feet bgs at MW-202 (4/12/2022).

Very hard till clay at 10 feet bgs at MW-202 (4/12/2022).

MW-202 soil cores from 0-30 feet bgs (4/12/2022). Zero feet bgs at top left. 30 feet bgs at lower right.

Very hard till clay from 35-40 feet bgs at MW-202 (4/12/2022).

MW-202 soil cores from 20-40 feet bgs (4/12/2022). 20 feet bgs at top left. 40 feet bgs at lower right.

Wooded area around MW-202 (4/13/2022).

Wooded area around MW-202 (4/13/2022).

Wooded area around MW-202 (4/13/2022).

Tracking to SB-21 boring location (4/13/2022)

Drilling at SB-21 (4/13/2022).

Lacustrine sandy gravel at 10 feet bgs at SB-21 (4/13/2022).

Retrieving soil core at boring SB-21 (4/13/2022).

Very hard till clay from 15-20 feet bgs at SB-21 (4/13/2022).

Very hard till clay from 15-20 feet bgs at SB-21 (4/13/2022).

Very hard till clay from 15-20 feet bgs at SB-21 (4/13/2022).

Very hard till clay from 20-25 feet bgs at SB-21 (4/13/2022).

Hardpan-like till clay from 25-30 feet bgs at SB-21 (4/13/2022).

Very hard till clay from 20-25 feet bgs at SB-21 (4/13/2022).

Hardpan-like till clay from 25-30 feet bgs at SB-21 (4/13/2022).

Hardpan-like till clay from 30-35 feet bgs at SB-21 (4/13/2022).

Hardpan-like till clay from 30-35 feet bgs at SB-21 (4/13/2022).

Till clay from 35-40 feet bgs (bottom), 25-30 feet bgs (middle), and 15-20 feet bgs (top) at SB-21 (4/13/2022).

Containerized soil cores containing refuse from boring SB-20 (4/14/2022).

Containerized cores containing refuse from boring SB-19 (4/14/2022).

Monitoring well MW-202 (4/14/2022).

Monitoring well MW-200 (4/14/2022).

Monitoring well MW-201 (4/14/2022).

Lacustrine gravelly sand soil sample from 17-20 feet bgs at MW-200 (4/16/2022).

Lacustrine silty sand soil sample from 20-24 feet bgs at MW-201 (4/16/2022).

Lacustrine sandy gravel soil sample from 5-7 feet bgs at MW-202 (4/16/2022).

Lacustrine sandy gravel soil sample from 5-7 feet bgs at MW-202 (4/16/2022).

Till clay soil sample from 25.5-30 feet bgs at MW-200 (4/16/2022).

Till clay soil sample from 25.5-30 feet bgs at MW-200 (4/16/2022).

Till clay soil sample from 25.5-30 feet bgs at MW-200 (4/16/2022).

Till clay soil sample from 37-39.5 feet bgs at MW-200 (4/16/2022).

Till clay soil sample from 37-39.5 feet bgs at MW-200 (4/16/2022).

Till clay soil sample from 29-30 feet bgs at MW-201 (4/16/2022).

Hardpan-like till soil sample (silty-clayey sand) from 39-40 feet bgs at MW-201 (4/16/2022).

Till clay soil sample from 8.5-10 feet bgs at MW-202 (4/16/2022).

Till clay soil sample from 8.5-10 feet bgs at MW-202 (4/16/2022).

Till clay soil sample from 8.5-10 feet bgs at MW-202 (4/16/2022).

Very hard till soil sample (clayey sand) from 34-35 feet bgs at SB-19 (4/16/2022).

Very hard till soil sample (clayey sand) from 34-35 feet bgs at SB-19 (4/16/2022).

Till clay soil sample from 47-49 feet bgs at SB-19 (4/16/2022).

Till clay soil sample from 47-49 feet bgs at SB-19 (4/16/2022).

Till clay soil sample from 45-50 feet bgs at SB-20 (4/16/2022).

Till clay soil sample from 45-50 feet bgs at SB-20 (4/16/2022).

Till clay soil sample from 45-50 feet bgs at SB-20 (4/16/2022).

Till clay soil sample from 23-25 feet bgs at SB-21 (4/16/2022).

Till clay soil sample from 23-25 feet bgs at SB-21 (4/16/2022).

Till clay soil sample from 23-25 feet bgs at SB-21 (4/16/2022).

APPENDIX B
BORING AND MONITORING WELL LOGS

BORING / WELL ID: MW-200

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,179.7 N; 13,015,473.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 759.04 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 9 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0									Surface Elev. = 756 NAD83
	SC 1	5.0			Brown to Dark Brown SAND and Clayey Sand, trace-little Gravel and Wood, moist (FILL)				
5				5.5		750.5			
	SC 2	5.0			Brown to Dark Brown SAND and Clayey Sand, little-some Wood, little Gravel, moist (FILL)				
10					Wet Concrete Rubble From 9-9.5 Ft. bgs				
				14.5		741.5			
15	SC 3	7.5		15.0	Gray Silty fine SAND, trace Gravel, wet (Lacustrine Sand)	741.0			
					Gray Gravelly SAND, trace-little Silt, wet (Lacustrine Sand) Oxidized Orange-Brown From 15.5-16.7 Ft. bgs				Soil Sample MW-200, 17-20 (SP)
20				21.0		735.0			
					Gray Sandy SILT, trace Clay, wet (Lacustrine-Till transition)				
25	SC 4	9.5		25.5		730.5			
					Gray Silty CLAY, trace Sand, moist (Till Clay)				Soil Sample MW-200, 25.5-30 (CL)
30									

WELL DIAGRAM

- Above-Ground Protective Cover
- Concrete Pad
- Sand for Drainage
- Bentonite Chips
- 2" Diameter PVC Riser
- Filter Sand
- 2" Diameter 10-Slot PVC Screen
- Bentonite Chips

ENV BORING/WELL LOG (PID) - GINT STD US LAB.GDT - 9/6/22 09:54 - W:\PROJECTS\PROJECTS K-O\M3460003\ADMIN\DRILLING\BORING LOGS\M3460002 BORING LOGS REV2.GPJ

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The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

BORING / WELL ID: MW-200

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,179.7 N; 13,015,473.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 759.04 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 9 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS	WELL DIAGRAM
30					Gray Silty CLAY, trace Sand, moist (Till Clay) *(continued)*					
				33.0		723.0				
					Gray Silty-Sandy CLAY, trace Gravel, dry-moist (Hardpan-like till)					
35	SC 5	9.0								
									Soil Sample MW-200, 37-39.5 (CL)	
40					Till Clay from 39.5-47 ft bgs					Bentonite Chips
45	SC 6	9.1								
					Hardpan-like till from 47-50 ft bgs					
50				50.0		706.0				
					Bottom of borehole at 50.0 feet.					

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BORING / WELL ID: MW-201

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/11/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,328.0 N; 13,015,755.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 764.12 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 10 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0									Surface Elev. = 761.1 NAD83
	SC 1	5.0		1.5	TOPSOIL	759.6			
5					Brown Silty SAND, trace-little Gravel, moist (Lacustrine Sand)				
	SC 2	5.0		8.0		753.1			
					Tan Silty Fine SAND, moist (Lacustrine Sand)				
10				10.0 ▽		751.1			
					Brown Silty SAND, occasional Gravelly pockets, wet (Lacustrine Sand)				
15	SC 3	10.0							
				18.0		743.1			
					Light Grayish-Brown Silty Fine SAND, trace Gravel, wet (Lacustrine Sand)				
20									
									Soil Sample MW-201, 20-24 (SM)
25	SC 4	10.0		24.5		736.6			
					Gray Silty CLAY, trace Sand, trace Gravel, moist (Till Clay)				
30									Soil Sample MW-201, 29-30 (CL)

WELL DIAGRAM

- Above-Ground Protective Cover
- Concrete Pad
- Sand for Drainage
- Bentonite Chips
- 2" Diameter PVC Riser
- Filter Sand
- 2" Diameter 10-Slot PVC Screen
- Bentonite Chips

ENV BORING/WELL LOG (PID) - GINT STD US LAB.GDT - 9/6/22 09:54 - W:\PROJECTS\PROJECTS K-O\M3460003\ADMIN\DRILLING\BORING LOGS\M3460002 BORING LOGS REV2.GPJ

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The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
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BORING / WELL ID: MW-201

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/11/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,328.0 N; 13,015,755.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 764.12 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 10 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS	WELL DIAGRAM
30					Gray Silty CLAY, trace Sand, trace Gravel, moist (Till Clay) *(continued)*					
35	SC 5	10.0			Hardpan-like till from 34.9-38.5 ft bgs					
				38.5		722.6				
40					Gray Silty-Clayey SAND, trace Gravel, dry (Hardpan-like till)			☒	Soil Sample MW-201, 39-40 (SC-SM)	Bentonite Chips
				42.0		719.1				
45	SC 6	10.0			Gray Silty CLAY, some Sand, trace-little Gravel, moist (Till Clay)					
50				50.0		711.1				
					Bottom of borehole at 50.0 feet.					

BORING / WELL ID: MW-202

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/13/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,211.3 N; 13,014,355.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 746.85 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 5 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0					Surface Elev. = 744.2 NAD83				
				1.0	TOPSOIL	743.2			
	SC 1	2.0			Dark Brown Organic Sandy CLAY, moist				
				4.0		740.2			
5				5.0	Brown Silty Fine SAND, trace Gravel, moist	739.2			
	SC 2	4.8		7.7	Gray Sandy GRAVEL, wet (Lacustrine Gravel)	736.5		X	Soil Sample MW-202, 5-7 (GW)
				8.5	Gray Clayey SILT, moist	735.7			
10					Gray Sandy CLAY, some Silt, trace-little Gravel, moist (Very Hard Till Clay)			X	Soil Sample MW-202, 8.5-10 (CL)
15	SC 3	8.0							
20									
25	SC 4	9.0							
30									

WELL DIAGRAM

- Above-Ground Protective Cover
- Concrete Pad
- Sand for Drainage
- 2" Diameter PVC Riser
- Bentonite Chips
- Filter Sand
- 2" Diameter 10-Slot PVC Screen
- Bentonite Chips

ENV BORING/WELL LOG (PID) - GINT STD US LAB.GDT - 9/6/22 09:54 - W:\PROJECTS\PROJECTS K-O\M3460003\ADMIN\DRILLING\BORING LOGS\M3460002 BORING LOGS REV2.GPJ

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2365 Haggerty Road South, Canton, MI 48188
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BORING / WELL ID: MW-202

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/13/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,211.3 N; 13,014,355.0 E (USSP MI South)
DRILLING METHOD Rotosonic
TOP OF CASING ELEV.: 746.85 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 5 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS	WELL DIAGRAM
30					Gray Sandy CLAY, some Silt, trace-little Gravel, moist (Very Hard Till Clay) *(continued)*					
35	SC 5	10.0								Bentonite Chips
40				40.0		704.2				
					Bottom of borehole at 40.0 feet.					

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www.manniksmithgroup.com

BORING ID: SB-19

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,079.6 N; 13,014,794.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 769.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: Not Encountered
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0				2.0	Brown Silty CLAY, trace-little Sand, trace Gravel, moist (Clay Cap)	767.5			
5	SC 1	3.0			Brown, Gray and Black SAND, Clay, Gravel, Wood, Refuse (FILL)				
10	SC 2	4.0							
15	SC 3	7.5							
20									
25	SC 4	5.0							
30				30.0		739.5			

(Continued Next Page)

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

BORING ID: SB-19

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 772,079.6 N; 13,014,794.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 769.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: Not Encountered
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
30					Gray, Gravelly SAND, moist (Lacustrine Sand)				
				33.5		736.0			
35	SC 5	10.0			Gray Clayey Sand-Sandy Clay, some Silt, trace Gravel, moist (Very Hard Till Clay)			☒	Soil Sample SB-19, 34-35 (SC)
40									
45	SC 6	8.5						☒	Soil Sample SB-19, 47-49 (CL)
50				50.0		719.5			
					Bottom of borehole at 50.0 feet.				

ENV BORING LOG (PID) - GINT STD US LAB.GDT - 9/6/22 09:55 - W:\PROJECTS\PROJECTS K-O\M3460003\ADMIN\DRILLING\BORING LOGS\M3460002 BORING LOGS REV2.GPJ

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
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BORING ID: SB-20

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,767.6 N; 13,014,829.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 769.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: Not Encountered
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0									
				2.0	Brown SIlty CLAY, tarce-little Sand, trace Gravel, moist (Clay Cap)	767.5			
	SC 1	2.8			Brown, Gray and Black SAND, Clay, Gravel, Wood, Refuse (FILL)				
5									
	SC 2	4.0							
10									
15	SC 3	8.3							
20									
25	SC 4	7.5							
				29.2		740.3			
30				30.0	Gray Gravelly SAND (Lacustrine Sand)	739.5			

(Continued Next Page)

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BORING ID: SB-20

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/12/22 **COMPLETED** 4/12/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,767.6 N; 13,014,829.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 769.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: Not Encountered
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
30									
35	SC 5	8.2		37.0	Brown Silty Fine SAND, moist (Lacustrine Sand)	732.5			
40				40.0	Brown Silty Fine SAND with Silt lenses, moist (Lacustrine Sand)	729.5			
45	SC 6	10.0		44.5	Gray Silty CLAY, some Sand, little Gravel, moist (Very Hard Till Clay)	725.0			
50				50.0	Gray Sandy CLAY, some Silt, trace Gravel, dry-moist (Hardpan-like Till)	719.5		X	Soil Sample SB-20, 45-50 (CL)
					Bottom of borehole at 50.0 feet.				

BORING ID: SB-21

The Mannik & Smith Group, Inc.
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www.manniksmithgroup.com

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,699.5 N; 13,014,311.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 746.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 5 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
0				0.5	TOPSOIL	746.0			
				1.0	Light Brown Clayey SILT, moist	745.5			
				1.7	Brown Silty SAND, moist	744.8			
	SC 1	3.0		3.0	Brown Clayey SAND, trace Gravel and Wood, moist	743.5			
					Light Brown Silty CLAY, trace Sand, moist				
5					▽ Becomes wet at 5 Ft. bgs				
	SC 2	3.0		7.0		739.5			
					Gray Sandy GRAVEL, wet (Lacustrine Gravel)				
10				12.0		734.5			
					Gray Sandy CLAY, some Silt, trace Gravel, moist (Very Hard Till Clay)				
15	SC 3	9.5							
20									
25	SC 4	10.0			Becomes Hardpan-like till at 25 Ft. bgs			X	Soil Sample SB-21, 23-25 (CL)
30				30.0		716.5			

(Continued Next Page)

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BORING ID: SB-21

CLIENT City of Mt. Pleasant, MI
PROJECT NAME Former Mt Pleasant Landfill RAP Implementation
PROJECT NUMBER M3460003
PROJECT LOCATION Mt. Pleasant, MI
DATE STARTED 4/13/22 **COMPLETED** 4/13/22
BORING DIAMETER: 6 inches
DRILLING CONTRACTOR Cascade Drilling
SURVEY COORDINATES: 771,699.5 N; 13,014,311.0 E (USSP MI South)
DRILLING METHOD Rotosonic
GROUND SURFACE ELEV.: 746.5 feet NAD83
LOGGED BY DJA **CHECKED BY**
GROUND WATER ENCOUNTERED DURING DRILLING: 5 FEET BGS
NOTES
WATER LEVEL AFTER DRILLING: N/A

DEPTH (FEET)	SAMPLE TYPE NUMBER	RECOVERY (FEET)	GRAPHIC LOG	DEPTH (FEET)	MATERIAL DESCRIPTION	ELEVATION (NAD83)	PID (ppm)	LABORATORY SAMPLE	REMARKS
30									
35	SC 5	10.0			Gray Sandy CLAY, some Silt, trace Gravel, moist (Hardpan-like till)				
40				40.0		706.5			
					Bottom of borehole at 40.0 feet.				

APPENDIX C
FIELD SAMPLING FORMS

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: DA/PH

OBSERVERS: _____

SAMPLE LOCATION: MW-101

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 3.76' TOC

WELL DIAMETER: _____

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1442	4.12	58.4	6.88	-21	1.47	86.1	9.46			
1445	4.14	55.6	6.92	-33	1.56	98.5	3.99			
1448	4.17	54.8	6.94	-38	1.59	3.3	3.17			
1451	4.20	54.7	6.92	-40	1.59	0.9	2.86			
1454	4.21	54.3	6.90	-41	1.59	0.0	2.76			
1457										
1500										

SAMPLE ID: MW-101

SAMPLE DATE: 5-16-22

SAMPLE TIME: 1500

Notes: _____

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: LHP, JOG

OBSERVERS: _____

SAMPLE LOCATION: MW-102

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 6.87

WELL DIAMETER: 1"

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1431	6.87	53.2	7.39	75	2.07	516	9.22		200	
1434	↓	50.4	7.24	34	2.33	89.3	5.42			
1437		49.7	7.24	-4	2.39	41.0	3.79			
1440		48.5	7.22	-31	2.43	33.1	2.69			
1443		48.1	7.21	-44	2.45	22.4	2.38			
1446		48.1	7.20	-48	2.46	18.3	2.24			
1449										
1452										
1455										
1458										
1501										

SAMPLE ID: MW-102

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1446

Notes: Began Purging @ 1428

SWL obtained but couldn't fit tubing & WLM in PVC

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: UMR, JOG

OBSERVERS: _____

SAMPLE LOCATION: MW-103

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: ~~2.24~~ 2.00'

WELL DIAMETER: 1"

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1233	2.02'	62.0	7.14	-4	1.59	175	13.20	8	200	
1236	2.10'	57.1	7.28	-10	1.15	52.2	6.92			
1239	2.11'	56.4	7.42	-1	1.08	53.8	6.05			
1242	2.11'	54.4	7.35	-8	1.24	44.3	4.83			
1245	2.11'	54.3	7.31	-13	1.33	47.7	3.14			
1248	2.11'	54.2	7.28	-16	1.51	48.4	2.33			
1251										
1254										
1257										
1300										

SAMPLE ID: MW-103

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1249

Notes: Began Purging @ 12:30

H_2O meter interfering w/ tubing, SO will leave WL constant after ~~initial~~ final pumping measurement

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: DA | PH

OBSERVERS: _____

SAMPLE LOCATION: MW-104

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 5.791

WELL DIAMETER: _____

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1249	5.61	53.9	7.09	13	0.852	21.5	9.66			
1252	5.81	51.5	7.01	-26	0.841	0.0	4.49			
1255	5.82	50.6	6.99	-40	0.844	0.0	3.77			
1258	5.82	50.3	6.98	-45	0.846	0.0	3.56			
1301	5.82	50.5	6.97	-49	0.848	0.0	3.40			
1304										
1307										

SAMPLE ID: MW-104

SAMPLE DATE: 5-16-22

SAMPLE TIME: 1302

Notes: _____

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5-16-22

PERSONNEL: DA/PH

OBSERVERS: _____

SAMPLE LOCATION: MW-105

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: 4.94' TOC

WELL DIAMETER: _____

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1324	5.33	60.9	7.15	-49	0.837	51.7	4.38		≈200	
1327	5.38	62.3	7.07	-64	0.855	26.7	2.62			
1330	5.38	59.5	7.07	-77	1.14	15.0	2.70			
1333	5.38	58.5	7.05	-81	1.28	10.6	2.61			
1336	5.41	56.2	7.03	-84	1.33	9.0	2.51			
1339		58.2	7.03	-85	1.34	8.5	2.45			
1342										

SAMPLE ID: MW-105

SAMPLE DATE: 5-16-22

SAMPLE TIME: 1342

Notes: _____

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: UMP, JSG

OBSERVERS: _____

SAMPLE LOCATION: MW-106

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: 72°/sunny

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: ~~6.26'~~ *6.26'

WELL DIAMETER: 1"

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1338	6.26'	53.4	7.37	51	1.84	42.4	5.67		200	
1341	6.27	53.0	7.37	7	1.75	30.8	3.14			
1344	6.26'	52.7	7.36	-18	1.70	24.2	2.71			
1347	6.26'	52.8	7.35	-28	1.69	20.8	2.44			
1350	6.26'	52.8	7.34	-37	1.69	18.7	2.33			
1353										
1356										
1359										
1402										

SAMPLE ID: MW-106

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1410

Notes: Began Purging @ 1335

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: JOG, LMP

OBSERVERS: _____

SAMPLE LOCATION: MW-~~202~~ 108

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: 72°/ sunny

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: ~~7.70~~ TOC

WELL DIAMETER: _____

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1053	8.24	51.4	7.13	4	1.95	580	3.97	0.16		
1056	8.85	47.0	7.11	33	2.52	397	5.81	0.20		
1059	9.60	48.0	7.10	58	2.43	360	4.91	0.30		

SAMPLE ID: MW-~~202~~ 108

SAMPLE DATE: 5/16/22

SAMPLE TIME: - - -

Notes: Began Purging @ ~~10:50~~ 1050

Well purged dry @ 10:58

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: DA/PH

OBSERVERS: _____

SAMPLE LOCATION: MW-109

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 4.22' BTOC

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: DISPOSABLE HDPE BAILER, NYLON ROPE, ULTRAMETER II WATER QUALITY METER

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
		16.4	6.04		7,700					
		15.3	6.42		1188					
		12.9	6.55		945					
		12.7	6.64		886					

SAMPLE ID: MW-109

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1139

Notes: SOMEWHAT CLOUDY WATER. POOR PRODUCTION.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022

PERSONNEL: DA/PH

OBSERVERS: _____

SAMPLE LOCATION: MW-200

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: 11.50' TOC

WELL DIAMETER: 2"

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1536	11.70	59.6	8.13	-147	2.80	155	8.31		≈200	
1539	11.68	58.3	7.62	-159	2.16	143	3.30			
1542	11.69	57.6	7.29	-129	1.90	123	2.67			
1545	11.68	57.4	7.19	-117	1.84	123	2.47			
1548	11.68	57.3	7.14	-112	1.80	103	2.32			
1551	11.68	57.4	7.12	-110	1.78	81.3	2.23			

SAMPLE ID: MW-200

SAMPLE DATE: 5-16-2022

SAMPLE TIME: 1555

Notes: DUP + FIELD BLANK COLLECTED AT MW-200

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: JNG PDH

OBSERVERS: _____

SAMPLE LOCATION: MW-201

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: 12.02

WELL DIAMETER: 2"

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized) 12.12	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1621	~~57.6~~	57.6	7.19	-192	1.61	26.1	9.16	0.1		
1624	12.15	53.3	7.32	~~-288~~	1.46	9.2	3.36	0.5		
1627	12.15	52.7	7.24	-345	1.45	5.6	2.67	0.5		
1630	12.15	52.6	7.24	-360	1.45	3.3	2.55	0.6		
1633	12.15	52.5	7.30	-385	1.44	1.4	2.44	0.7		
1636	12.15	52.1	7.33	-400	1.44	1.2	2.39	0.8		
1639	12.15	52.1	7.36	-428	1.44	0.4	2.36	0.9		

SAMPLE ID: MW 201

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1645

Notes:

Sample @ 1645

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: LMP, JOG

OBSERVERS: _____

SAMPLE LOCATION: MW-202

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: 72°/Sunny

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: 4.26'

WELL DIAMETER: 2"

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1126	4.30	54.5	7.03	215	2.42	383	8.07		200	
1129	4.30	51.7	6.91	161	2.53	171	7.56			
1132	4.28	50.9	6.88	9	2.65	97.5	5.13			
1135	4.29	50.7	6.89	-29	2.68	73.6	3.65			
1138	4.29	50.7	6.89	-45	2.69	49.6	2.77			
1141	4.29	50.5	6.90	-51	2.71	39.7	2.89			
1144										
1147										
1150										

SAMPLE ID: MW-202

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1145

Notes: Began Purging @ 1723

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: LMP, JOG

OBSERVERS: _____

SAMPLE LOCATION: MW-9-20

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: 75°/sunny

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 6.59'

WELL DIAMETER: 1"

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
1512		52.6	7.27	-41	1.23	98.1	4.57		200	
1515		53.1	7.31	-46	1.24	88.5	5.08			
1518										
1521										
1524										
1527										
1530										
1533										
1536										
1539										

SAMPLE ID: MW-9-20

SAMPLE DATE: 5/16/22

SAMPLE TIME: [redacted]

Notes: Began Purging @ 15:10
Went dry @ ~~1515~~ 1516

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: WP, JOG

OBSERVERS: _____

SAMPLE LOCATION: MW-10-20

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: 70°/Sunny

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 5.29'

WELL DIAMETER: 1"

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1532	5.71'	54.5	7.30	-28	1.43	297	8.94		200	
1535	5.68'	51.1	7.31	-46	1.98	208	5.14			
1538	5.67'	50.1	7.35	-68	2.14	138	2.78			
1541	5.67'	49.7	7.34	-78	2.15	80.5	2.13			
1544	5.68'	49.5	7.33	-83	2.16	51.4	1.94			
1547	5.69'	49.1	7.32	-87	2.17	38.6	1.84			
1550	5.69'	48.9	7.32	-89	2.17	31.6	1.75			
1553	5.69'	48.8	7.31	-92	2.18	28.7	1.71			
1556										
1559										
1602										

SAMPLE ID: MW-10-26

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1553

Notes: Began Purging @ 1530

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: DA/HP

OBSERVERS: _____

SAMPLE LOCATION: MW-14-20

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

DEPTH TO WATER LEVEL: 6.22 6.22

WELL DIAMETER: _____

CASING TYPE: PVC

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C) +/- 3%	Ph +/- 0.1	ORP (mV) +/- 10 mV	COND. (mS/cm) +/- 3%	TURB. (NTU)[2] +/- 10%	DO (mg/L)[1] +/- 10%	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
1035	6.78	55.7	7.07	-99	1.82	196	2.66		~200	
1038	6.69	56.1	7.14	-94	1.80	180	7.01			
1041	6.69	55.3	7.15	-105	1.83	179	5.00			
1044	6.70	54.5	7.13	-108	1.84	195	4.04			
1047	6.70	54.6	7.13	-109	1.84	193	3.79			
1050										
1053										
1056										

SAMPLE ID: MW-14-20

SAMPLE DATE: 5-16-22

SAMPLE TIME: 1055

Notes: _____

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/22

PERSONNEL: JDG

OBSERVERS: _____

SAMPLE LOCATION: MW-15-20

PROJECT #: M3460003

SITE NAME: MT. PLEASANT LANDFILL

SITE ADDRESS: 1303 N. FRANKLIN

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: HDPE

MONITORING EQUIPMENT: HDPE TUBING, PERISTALTIC PUMP, HORIBA

DEPTH TO WATER LEVEL: 5.61

WELL DIAMETER: _____

CASING TYPE: PVC

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			
0957	5.36	51.5	7.69	178	1.59	200	6.21	0.10		
1004	5.34	52.0	7.04	27	1.58	279	4.46	0.20		
1003	~~5.34~~ 5.34	52.7	7.02	-17	1.57	239	3.48	0.30		
1006	5.34	53.3	7.02	-25	1.57	269	3.15	0.40		
1009	5.34	53.6	7.02	-28	1.59	184	2.98	0.50		
1012	5.35	53.8	7.02	-32	1.65	109	2.85	0.60		

SAMPLE ID: MW 15-20

SAMPLE DATE: 5/16/22

SAMPLE TIME: 1025

Notes: Started purge @ 9:56

PFAS Sampled @ 1030

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-107

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

DEPTH TO WATER LEVEL: 5.02'

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-1-19

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

MONITORING EQUIPMENT: _____

DEPTH TO WATER LEVEL: 6.76'

WELL DIAMETER: _____

CASING TYPE: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

SAMPLE LOCATION: MW-2-19

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

PERSONNEL: DA

SITE ADDRESS: _____

OBSERVERS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

DEPTH TO WATER LEVEL: 5.20'

SCREEN LENGTH: _____

WELL DIAMETER: _____

TUBING TYPE: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

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DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-7-20

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

DEPTH TO WATER LEVEL: 12.66'

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY — NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-12-20

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

DEPTH TO WATER LEVEL: 5.39'

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-16-20

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

DEPTH TO WATER LEVEL: 6.52'

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY — NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

Mannik Smith GROUP — TECHNICAL SKILL. CREATIVE SPIRIT. — www.MannikSmithGroup.com

DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-17-20

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

DEPTH TO WATER LEVEL: 7.29'

WELL DIAMETER: _____

CASING TYPE: _____

MONITORING EQUIPMENT: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

LOW FLOW GROUND WATER SAMPLING FORM

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DATE: 5/16/2022 A.M.

PERSONNEL: DA

OBSERVERS: _____

SAMPLE LOCATION: MW-X

PROJECT #: M3460003

SITE NAME: FORMER MT. PLEASANT LANDFILL

SITE ADDRESS: _____

SITE CONDITIONS: _____

DEPTH OF WELL: _____

SCREEN LENGTH: _____

TUBING TYPE: _____

MONITORING EQUIPMENT: _____

DEPTH TO WATER LEVEL: 4.74

WELL DIAMETER: _____

CASING TYPE: _____

TIME	WATER LEVEL (<0.3 feet once stabilized)	TEMP. (°F/°C)	Ph	ORP (mV)	COND. (mS/cm)	TURB. (NTU)[2]	DO (mg/L)[1]	VOLUME PURGED (Gallons)	PUMP RATE (ml/min)	NOTES
		+/- 3%	+/- 0.1	+/- 10 mV	+/- 3%	+/- 10%	+/- 10%			

SAMPLE ID: —

SAMPLE DATE: —

SAMPLE TIME: —

Notes: STATIC WATER LEVEL ONLY – NO GROUNDWATER SAMPLE COLLECTED.

[1] - 10% for values greater than 0.5 mg/L, if three DO values are less than 0.5 mg/L, consider the values as stabilized

[2] - 10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized

APPENDIX D
LABORATORY ANALYTICAL REPORT (GROUNDWATER)

01-Jun-2022

Dave Adler
The Mannik & Smith Group, Inc.
2365 Haggerty Road South
Suite 100
Canton, MI 48188

Re: **Former Mount Pleasant Landfill** Work Order: **22051511**

Dear Dave,

ALS Environmental received 16 samples on 17-May-2022 11:50 PM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 143.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Julienn C. Williams

Electronically approved by: Julienn Williams

Julienn Williams
Project Manager

Report of Laboratory Analysis

Certificate No: MI: 0022

ALS Group, USA

Date: 01-Jun-22

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
Work Order: **22051511**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
22051511-01	MW-101	Groundwater		5/16/2022 15:00	5/17/2022 23:50	☐
22051511-02	MW-102	Groundwater		5/16/2022 14:46	5/17/2022 23:50	☐
22051511-03	MW-103	Groundwater		5/16/2022 12:49	5/17/2022 23:50	☐
22051511-04	MW-104	Groundwater		5/16/2022 13:02	5/17/2022 23:50	☐
22051511-05	MW-105	Groundwater		5/16/2022 13:42	5/17/2022 23:50	☐
22051511-06	MW-106	Groundwater		5/16/2022 14:10	5/17/2022 23:50	☐
22051511-07	MW-200	Groundwater		5/16/2022 15:55	5/17/2022 23:50	☐
22051511-08	MW-201	Groundwater		5/16/2022 16:45	5/17/2022 23:50	☐
22051511-09	MW-202	Groundwater		5/16/2022 11:45	5/17/2022 23:50	☐
22051511-10	MW-10-20	Groundwater		5/16/2022 15:53	5/17/2022 23:50	☐
22051511-11	MW-14-20	Groundwater		5/16/2022 10:55	5/17/2022 23:50	☐
22051511-12	MW-15-20	Groundwater		5/16/2022 10:25	5/17/2022 23:50	☐
22051511-13	Field Blank	Groundwater		5/16/2022 15:45	5/17/2022 23:50	☐
22051511-14	DUP	Groundwater		5/16/2022	5/17/2022 23:50	☐
22051511-15	Trip Blank	Water		5/16/2022	5/17/2022 23:50	☐
22051511-16	MW-109	Groundwater		5/16/2022	5/17/2022 23:50	☐

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
WorkOrder: **22051511**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
ng/L	Nanograms per Liter

Client:	The Mannik & Smith Group, Inc.
Project:	Former Mount Pleasant Landfill
Work Order:	22051511

Case Narrative

The attached "Sample Receipt Checklist" documents the date of receipt, status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. A copy of the laboratory's scope of accreditation is available upon request.

Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting.

Any flags on MS/MSD samples not addressed in this narrative are unrelated to samples in this report.

With the following exceptions, all sample analyses achieved analytical criteria.

Batch 196707, Method E537 Mod, Sample MW-15-20 (22051511-12E): EIS01: 13C2-PFHxDA_IS failed low.

Batch 196606, Method E537 Mod, Sample MW-102 (22051511-02E): The extracted internal standard response was outside recovery criteria with high bias; sample results may exhibit bias. 13C-4_2-FTS_IS, 13C2-6_2-FTS_IS

Batch 196606, Method E537 Mod, Sample MW-105 (22051511-05E): One or more surrogate recoveries were above the upper control limits. The sample was non-detect, therefore, no qualification is needed. 13C2-FtS 4:2

Batch 196707, Method E537 Mod, Sample MW-201 (22051511-08E): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit bias. d3-N-MeFOSAA_IS

Batch 196707, Method E537 Mod, Sample MW-201 (22051511-08E): One or more surrogate recoveries were below the lower control limits. The sample results may be biased low. d3-N-MeFOSAA

Batch 196707, Method E537 Mod, Sample MW-202 (22051511-09E): The extracted internal

standard response was outside recovery criteria with low bias; sample results may exhibit bias. d7-N-MeFOSE_IS

Batch 196707, Method E537 Mod, Sample MW-202 (22051511-09E): The extracted internal standard response was outside recovery criteria with high bias; sample results may exhibit bias. 13C-4_2-FTS_IS, 13C2-6_2-FTS_IS

Batch 196707, Method E537 Mod, Sample MW-10-20 (22051511-10E): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit bias. d5-N-EtFOSAA_IS, 13C-FOSA_IS, d7-N-MeFOSE_IS

Batch 196707, Method E537 Mod, Sample MW-10-20 (22051511-10E): The extracted internal standard response was outside recovery criteria with high bias; sample results may exhibit bias. 13C-4_2-FTS_IS

Batch 196707, Method E537 Mod, Sample MW-14-20 (22051511-11E): The extracted internal standard response was outside recovery criteria with high bias; sample results may exhibit bias. 13C-4_2-FTS_IS

Batch 196707, Method E537 Mod, Sample MW-15-20 (22051511-12E): The Continuing Calibration Verification did not meet method acceptance criteria for the following analytes, results are to be considered estimated: d3-N-MeFOSAA (target passes in CCV)

Batch 196707, Method E537 Mod, Sample MW-15-20 (22051511-12E): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit bias. d3-N-MeFOSAA_IS, d5-N-EtFOSAA_IS, d5-NEtFOSA_IS, d9-EtFOSE_IS, d7-N-MeFOSE_IS, 13C-PFTeDA_IS

Batch 196707, Method E537 Mod, Sample Field Blank (22051511-13A): The Continuing Calibration Verification did not meet method acceptance criteria for the following analytes, results are to be considered estimated: d3-N-MeFOSAA (target passes in CCV)

Batch 196707, Method E537 Mod, Sample Field Blank (22051511-13A): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit bias. d5-N-EtFOSAA_IS, 13C-FOSA_IS, d7-N-MeFOSE_IS

Batch 196707, Method E537 Mod, Sample DUP (22051511-14E): The Continuing Calibration Verification did not meet acceptance criteria with high bias, however, the sample results were non-detect for the following analytes: 11Cl-Pf3OUdS, FTS 10:2

Batch 196707, Method E537 Mod, Sample DUP (22051511-14E): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit

bias. d3-N-MeFOSAA_IS, 13C-PFUnDA_IS, d5-N-EtFOSAA_IS, 13C-FOSA_IS, 13C-PFDoA_IS, d7-N-MeFOSE_IS

Batch 196707, Method E537 Mod, Sample DUP (22051511-14E): One or more surrogate recoveries were below the lower control limits. The sample results may be biased low. d3-N-MeFOSAA

Batch 196707, Method E537 Mod, Sample MW-109 (22051511-16E): The extracted internal standard response was outside recovery criteria with low bias; sample results may exhibit bias. d3-N-MeFOSAA_IS, d5-N-EtFOSAA_IS, 13C-FOSA_IS, 13C-PFDoA_IS, d7-N-MeFOSE_IS, 13C-PFTeDA_IS

Batch 196624, Method SW846 8270D, Sample SLCSDW1-196624: The RPD between the LCS and LCSD was outside of the control limit. The sample results should be considered estimated for this analyte: 2,4-Dinitrophenol

Batch 196747, Method SW6020B, Sample 22051511-01DMS: The MS recovery was above the upper control limit. The corresponding result in the parent sample may be biased high for this analyte: Al, Zn

Batch 196747, Method SW6020B, Sample 22051511-01DMSD: The RPD between the MS and MSD was outside of the control limit. The corresponding result should be considered estimated for this compound: Al, Zn

ALS Group, USA

Date: *01-Jun-2022*

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
Work Order: 22051511
Sample ID: MW-101
Lab ID: 22051511-01
Collection Date: 5/16/2022 03:00 PM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 05:26 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 05:26 AM
Surr: Decachlorobiphenyl	*102*		*42-153*	*%REC*	1	5/21/2022 05:26 AM
Surr: Tetrachloro-m-xylene	*88.9*		*48-127*	*%REC*	1	5/21/2022 05:26 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:29 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.015**		**0.010**	**mg/L**	1	5/23/2022 07:10 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Barium	**0.097**		**0.0050**	**mg/L**	1	5/23/2022 07:10 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:10 PM
Boron	**0.30**		**0.020**	**mg/L**	1	5/23/2022 07:10 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:10 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:10 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:10 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorobutanesulfonic Acid (PFBS)	**6.5**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorobutanoic Acid (PFBA)	**15**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.8	ng/L	1	5/27/2022 03:30 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-101 **Lab ID:** 22051511-01
Collection Date: 5/16/2022 03:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorododecanoic Acid (PFDoA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluoroheptanoic Acid (PFHpA)	**8.6**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorohexanesulfonic Acid (PFHxS)	**51**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorohexanoic Acid (PFHxA)	**8.2**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorononanesulfonic Acid (PFNS)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorononanoic Acid (PFNA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorooctanesulfonamide (PFOSA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorooctanesulfonic Acid (PFOS)	**45**		**1.9**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorooctanoic Acid (PFOA)	**37**		**1.9**	**ng/L**	1	5/27/2022 03:30 PM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluoropentanoic Acid (PFPeA)	**5.8**		**4.8**	**ng/L**	1	5/27/2022 03:30 PM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluorotridecanoic Acid (PFTriA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Perfluoroundecanoic Acid (PFUnA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/27/2022 03:30 PM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.8	ng/L	1	5/27/2022 03:30 PM
11Cl-Pf3OUdS	ND		4.8	ng/L	1	5/27/2022 03:30 PM
9Cl-PF3ONS	ND		4.8	ng/L	1	5/27/2022 03:30 PM
Surr: 13C2-FtS 4:2	*108*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-FtS 6:2	*96.0*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-FtS 8:2	*74.6*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-PFDA	*62.9*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-PFDoA	*53.3*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-PFHxA	*82.2*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-PFTeA	*82.0*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C2-PFUnA	*67.2*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C3-HFPO-DA	*54.2*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C3-PFBS	*76.2*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C4-PFBA	*70.9*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C4-PFHpA	*58.1*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C4-PFOA	*66.5*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C4-PFOS	*71.9*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C5-PFNA	*73.6*		*50-150*	*%REC*	1	5/27/2022 03:30 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-101 **Lab ID:** 22051511-01
Collection Date: 5/16/2022 03:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*73.7*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 13C8-FOSA	*69.6*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: 18O2-PFHxS	*67.8*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: d5-N-EtFOSAA	*59.6*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
Surr: d3-N-MeFOSAA	*63.8*		*50-150*	*%REC*	1	5/27/2022 03:30 PM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4,5-Trichlorophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4,6-Trichlorophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4-Dichlorophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4-Dimethylphenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4-Dinitrophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2,4-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 07:41 PM
2,6-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Chloronaphthalene	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Chlorophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Methylnaphthalene	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Methylphenol	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Nitroaniline	ND		20	µg/L	1	5/20/2022 07:41 PM
2-Nitrophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
3&4-Methylphenol	ND		20	µg/L	1	5/20/2022 07:41 PM
3,3´-Dichlorobenzidine	ND		20	µg/L	1	5/20/2022 07:41 PM
3-Nitroaniline	ND		20	µg/L	1	5/20/2022 07:41 PM
4,6-Dinitro-2-methylphenol	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Bromophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Chloro-3-methylphenol	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Chloroaniline	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Chlorophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Nitroaniline	ND		20	µg/L	1	5/20/2022 07:41 PM
4-Nitrophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
Acenaphthene	ND		20	µg/L	1	5/20/2022 07:41 PM
Acenaphthylene	ND		20	µg/L	1	5/20/2022 07:41 PM
Acetophenone	ND		4.0	µg/L	1	5/20/2022 07:41 PM
Anthracene	ND		20	µg/L	1	5/20/2022 07:41 PM
Atrazine	ND		4.0	µg/L	1	5/20/2022 07:41 PM
Benzaldehyde	ND		4.0	µg/L	1	5/20/2022 07:41 PM
Benzo(a)anthracene	ND		20	µg/L	1	5/20/2022 07:41 PM
Benzo(a)pyrene	ND		20	µg/L	1	5/20/2022 07:41 PM
Benzo(b)fluoranthene	ND		20	µg/L	1	5/20/2022 07:41 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-101 **Lab ID:** 22051511-01
Collection Date: 5/16/2022 03:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		20	µg/L	1	5/20/2022 07:41 PM
Benzo(k)fluoranthene	ND		20	µg/L	1	5/20/2022 07:41 PM
Bis(2-chloroethoxy)methane	ND		20	µg/L	1	5/20/2022 07:41 PM
Bis(2-chloroethyl)ether	ND		20	µg/L	1	5/20/2022 07:41 PM
Bis(2-chloroisopropyl)ether	ND		20	µg/L	1	5/20/2022 07:41 PM
Bis(2-ethylhexyl)phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Butyl benzyl phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Caprolactam	ND		40	µg/L	1	5/20/2022 07:41 PM
Carbazole	ND		20	µg/L	1	5/20/2022 07:41 PM
Chrysene	ND		20	µg/L	1	5/20/2022 07:41 PM
Dibenzo(a,h)anthracene	ND		20	µg/L	1	5/20/2022 07:41 PM
Dibenzofuran	ND		20	µg/L	1	5/20/2022 07:41 PM
Diethyl phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Dimethyl phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Di-n-butyl phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Di-n-octyl phthalate	ND		20	µg/L	1	5/20/2022 07:41 PM
Fluoranthene	ND		20	µg/L	1	5/20/2022 07:41 PM
Fluorene	ND		20	µg/L	1	5/20/2022 07:41 PM
Hexachlorobenzene	ND		20	µg/L	1	5/20/2022 07:41 PM
Hexachlorobutadiene	ND		20	µg/L	1	5/20/2022 07:41 PM
Hexachlorocyclopentadiene	ND		20	µg/L	1	5/20/2022 07:41 PM
Hexachloroethane	ND		20	µg/L	1	5/20/2022 07:41 PM
Indeno(1,2,3-cd)pyrene	ND		20	µg/L	1	5/20/2022 07:41 PM
Isophorone	ND		20	µg/L	1	5/20/2022 07:41 PM
Naphthalene	ND		20	µg/L	1	5/20/2022 07:41 PM
Nitrobenzene	ND		20	µg/L	1	5/20/2022 07:41 PM
N-Nitrosodi-n-propylamine	ND		20	µg/L	1	5/20/2022 07:41 PM
N-Nitrosodiphenylamine	ND		20	µg/L	1	5/20/2022 07:41 PM
Pentachlorophenol	ND		20	µg/L	1	5/20/2022 07:41 PM
Phenanthrene	ND		20	µg/L	1	5/20/2022 07:41 PM
Phenol	ND		20	µg/L	1	5/20/2022 07:41 PM
Pyrene	ND		20	µg/L	1	5/20/2022 07:41 PM
Surr: 2,4,6-Tribromophenol	*68.5*		*27-83*	*%REC*	1	5/20/2022 07:41 PM
Surr: 2-Fluorobiphenyl	*61.3*		*26-79*	*%REC*	1	5/20/2022 07:41 PM
Surr: 2-Fluorophenol	*41.4*		*13-56*	*%REC*	1	5/20/2022 07:41 PM
Surr: 4-Terphenyl-d14	*80.4*		*43-106*	*%REC*	1	5/20/2022 07:41 PM
Surr: Nitrobenzene-d5	*62.0*		*29-80*	*%REC*	1	5/20/2022 07:41 PM
Surr: Phenol-d6	*29.2*		*10-35*	*%REC*	1	5/20/2022 07:41 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260C**			Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-101 **Lab ID:** 22051511-01
Collection Date: 5/16/2022 03:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 12:06 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 12:06 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Acetone	ND		10	µg/L	1	5/20/2022 12:06 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 12:06 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 12:06 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 12:06 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 12:06 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-101 **Lab ID:** 22051511-01
Collection Date: 5/16/2022 03:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 12:06 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 12:06 AM
Surr: 1,2-Dichloroethane-d4	*102*		*75-120*	*%REC*	1	5/20/2022 12:06 AM
Surr: 4-Bromofluorobenzene	*87.2*		*80-110*	*%REC*	1	5/20/2022 12:06 AM
Surr: Dibromofluoromethane	*107*		*85-115*	*%REC*	1	5/20/2022 12:06 AM
Surr: Toluene-d8	*100*		*85-110*	*%REC*	1	5/20/2022 12:06 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 05:39 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 05:39 AM
Surr: Decachlorobiphenyl	*73.3*		*42-153*	*%REC*	1	5/21/2022 05:39 AM
Surr: Tetrachloro-m-xylene	*85.3*		*48-127*	*%REC*	1	5/21/2022 05:39 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:31 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	ND		0.010	mg/L	1	5/23/2022 07:15 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Arsenic	**0.0054**		**0.0050**	**mg/L**	1	5/23/2022 07:15 PM
Barium	**0.18**		**0.0050**	**mg/L**	1	5/23/2022 07:15 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:15 PM
Boron	**0.58**		**0.020**	**mg/L**	1	5/23/2022 07:15 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:15 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:15 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 04:55 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorobutanesulfonic Acid (PFBS)	**27**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorobutanoic Acid (PFBA)	**31**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.8	ng/L	1	5/25/2022 04:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluoroheptanesulfonic Acid (PFHpS)	**6.0**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluoroheptanoic Acid (PFHpA)	**32**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorohexanesulfonic Acid (PFHxS)	**50**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorohexanoic Acid (PFHxA)	**38**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorononanoic Acid (PFNA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorooctanesulfonic Acid (PFOS)	**83**		**1.9**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorooctanoic Acid (PFOA)	**92**		**1.9**	**ng/L**	1	5/25/2022 04:56 AM
Perfluoropentanesulfonic Acid (PFPeS)	**31**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluoropentanoic Acid (PFPeA)	**15**		**4.8**	**ng/L**	1	5/25/2022 04:56 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/25/2022 04:56 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.8	ng/L	1	5/25/2022 04:56 AM
11Cl-Pf3OUdS	ND		4.8	ng/L	1	5/25/2022 04:56 AM
9Cl-PF3ONS	ND		4.8	ng/L	1	5/25/2022 04:56 AM
Surr: 13C2-FtS 4:2	*284*	S	*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-FtS 6:2	*264*	S	*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-FtS 8:2	*139*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-PFDA	*77.8*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-PFDoA	*74.0*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-PFHxA	*76.1*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-PFTeA	*91.4*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C2-PFUnA	*68.3*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C3-HFPO-DA	*62.2*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C3-PFBS	*68.7*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C4-PFBA	*72.6*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C4-PFHpA	*75.5*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C4-PFOA	*86.1*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C4-PFOS	*70.8*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C5-PFNA	*77.1*		*50-150*	*%REC*	1	5/25/2022 04:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*69.4*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 13C8-FOSA	*62.0*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: 18O2-PFHxS	*59.4*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: d5-N-EtFOSAA	*84.6*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
Surr: d3-N-MeFOSAA	*84.1*		*50-150*	*%REC*	1	5/25/2022 04:56 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4,5-Trichlorophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4,6-Trichlorophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4-Dichlorophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4-Dimethylphenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4-Dinitrophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2,4-Dinitrotoluene	ND		21	µg/L	1	5/20/2022 08:02 PM
2,6-Dinitrotoluene	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Chloronaphthalene	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Chlorophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Methylnaphthalene	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Methylphenol	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Nitroaniline	ND		21	µg/L	1	5/20/2022 08:02 PM
2-Nitrophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
3&4-Methylphenol	ND		21	µg/L	1	5/20/2022 08:02 PM
3,3´-Dichlorobenzidine	ND		21	µg/L	1	5/20/2022 08:02 PM
3-Nitroaniline	ND		21	µg/L	1	5/20/2022 08:02 PM
4,6-Dinitro-2-methylphenol	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Bromophenyl phenyl ether	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Chloro-3-methylphenol	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Chloroaniline	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Chlorophenyl phenyl ether	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Nitroaniline	ND		21	µg/L	1	5/20/2022 08:02 PM
4-Nitrophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
Acenaphthene	ND		21	µg/L	1	5/20/2022 08:02 PM
Acenaphthylene	ND		21	µg/L	1	5/20/2022 08:02 PM
Acetophenone	ND		4.1	µg/L	1	5/20/2022 08:02 PM
Anthracene	ND		21	µg/L	1	5/20/2022 08:02 PM
Atrazine	ND		4.1	µg/L	1	5/20/2022 08:02 PM
Benzaldehyde	ND		4.1	µg/L	1	5/20/2022 08:02 PM
Benzo(a)anthracene	ND		21	µg/L	1	5/20/2022 08:02 PM
Benzo(a)pyrene	ND		21	µg/L	1	5/20/2022 08:02 PM
Benzo(b)fluoranthene	ND		21	µg/L	1	5/20/2022 08:02 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		21	µg/L	1	5/20/2022 08:02 PM
Benzo(k)fluoranthene	ND		21	µg/L	1	5/20/2022 08:02 PM
Bis(2-chloroethoxy)methane	ND		21	µg/L	1	5/20/2022 08:02 PM
Bis(2-chloroethyl)ether	ND		21	µg/L	1	5/20/2022 08:02 PM
Bis(2-chloroisopropyl)ether	ND		21	µg/L	1	5/20/2022 08:02 PM
Bis(2-ethylhexyl)phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Butyl benzyl phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Caprolactam	ND		41	µg/L	1	5/20/2022 08:02 PM
Carbazole	ND		21	µg/L	1	5/20/2022 08:02 PM
Chrysene	ND		21	µg/L	1	5/20/2022 08:02 PM
Dibenzo(a,h)anthracene	ND		21	µg/L	1	5/20/2022 08:02 PM
Dibenzofuran	ND		21	µg/L	1	5/20/2022 08:02 PM
Diethyl phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Dimethyl phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Di-n-butyl phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Di-n-octyl phthalate	ND		21	µg/L	1	5/20/2022 08:02 PM
Fluoranthene	ND		21	µg/L	1	5/20/2022 08:02 PM
Fluorene	ND		21	µg/L	1	5/20/2022 08:02 PM
Hexachlorobenzene	ND		21	µg/L	1	5/20/2022 08:02 PM
Hexachlorobutadiene	ND		21	µg/L	1	5/20/2022 08:02 PM
Hexachlorocyclopentadiene	ND		21	µg/L	1	5/20/2022 08:02 PM
Hexachloroethane	ND		21	µg/L	1	5/20/2022 08:02 PM
Indeno(1,2,3-cd)pyrene	ND		21	µg/L	1	5/20/2022 08:02 PM
Isophorone	ND		21	µg/L	1	5/20/2022 08:02 PM
Naphthalene	ND		21	µg/L	1	5/20/2022 08:02 PM
Nitrobenzene	ND		21	µg/L	1	5/20/2022 08:02 PM
N-Nitrosodi-n-propylamine	ND		21	µg/L	1	5/20/2022 08:02 PM
N-Nitrosodiphenylamine	ND		21	µg/L	1	5/20/2022 08:02 PM
Pentachlorophenol	ND		21	µg/L	1	5/20/2022 08:02 PM
Phenanthrene	ND		21	µg/L	1	5/20/2022 08:02 PM
Phenol	ND		21	µg/L	1	5/20/2022 08:02 PM
Pyrene	ND		21	µg/L	1	5/20/2022 08:02 PM
Surr: 2,4,6-Tribromophenol	*73.4*		*27-83*	*%REC*	1	5/20/2022 08:02 PM
Surr: 2-Fluorobiphenyl	*62.8*		*26-79*	*%REC*	1	5/20/2022 08:02 PM
Surr: 2-Fluorophenol	*41.7*		*13-56*	*%REC*	1	5/20/2022 08:02 PM
Surr: 4-Terphenyl-d14	*85.7*		*43-106*	*%REC*	1	5/20/2022 08:02 PM
Surr: Nitrobenzene-d5	*64.0*		*29-80*	*%REC*	1	5/20/2022 08:02 PM
Surr: Phenol-d6	*27.4*		*10-35*	*%REC*	1	5/20/2022 08:02 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 12:24 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 12:24 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Acetone	ND		10	µg/L	1	5/20/2022 12:24 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 12:24 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 12:24 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 12:24 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 12:24 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-102 **Lab ID:** 22051511-02
Collection Date: 5/16/2022 02:46 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 12:24 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 12:24 AM
Surr: 1,2-Dichloroethane-d4	*106*		*75-120*	*%REC*	1	5/20/2022 12:24 AM
Surr: 4-Bromofluorobenzene	*95.6*		*80-110*	*%REC*	1	5/20/2022 12:24 AM
Surr: Dibromofluoromethane	*101*		*85-115*	*%REC*	1	5/20/2022 12:24 AM
Surr: Toluene-d8	*103*		*85-110*	*%REC*	1	5/20/2022 12:24 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
Work Order: 22051511
Sample ID: MW-103
Lab ID: 22051511-03
Collection Date: 5/16/2022 12:49 PM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 05:52 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 05:52 AM
Surr: Decachlorobiphenyl	*111*		*42-153*	*%REC*	1	5/21/2022 05:52 AM
Surr: Tetrachloro-m-xylene	*92.1*		*48-127*	*%REC*	1	5/21/2022 05:52 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:33 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	ND		0.010	mg/L	1	5/23/2022 07:20 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Arsenic	**0.025**		**0.0050**	**mg/L**	1	5/23/2022 07:20 PM
Barium	**0.057**		**0.0050**	**mg/L**	1	5/23/2022 07:20 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:20 PM
Boron	**0.16**		**0.020**	**mg/L**	1	5/23/2022 07:20 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:20 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:20 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:20 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorobutanesulfonic Acid (PFBS)	**7.3**		**4.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluorobutanoic Acid (PFBA)	**40**		**4.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.9	ng/L	1	5/25/2022 05:04 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-103 **Lab ID:** 22051511-03
Collection Date: 5/16/2022 12:49 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluoroheptanoic Acid (PFHpA)	**6.9**		**4.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluorohexanesulfonic Acid (PFHxS)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorohexanoic Acid (PFHxA)	**19**		**4.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorononanoic Acid (PFNA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		1.9	ng/L	1	5/25/2022 05:04 AM
Perfluorooctanoic Acid (PFOA)	**4.8**		**1.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluoropentanoic Acid (PFPeA)	**7.2**		**4.9**	**ng/L**	1	5/25/2022 05:04 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 05:04 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.9	ng/L	1	5/25/2022 05:04 AM
11Cl-Pf3OUdS	ND		4.9	ng/L	1	5/25/2022 05:04 AM
9Cl-PF3ONS	ND		4.9	ng/L	1	5/25/2022 05:04 AM
Surr: 13C2-FtS 4:2	*124*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-FtS 6:2	*89.3*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-FtS 8:2	*115*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-PFDA	*71.3*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-PFDoA	*64.4*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-PFHxA	*65.5*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-PFTeA	*76.5*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C2-PFUnA	*95.3*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C3-HFPO-DA	*58.6*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C3-PFBS	*77.0*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C4-PFBA	*81.2*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C4-PFHpA	*102*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C4-PFOA	*98.0*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C4-PFOS	*70.1*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C5-PFNA	*96.2*		*50-150*	*%REC*	1	5/25/2022 05:04 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-103 **Lab ID:** 22051511-03
Collection Date: 5/16/2022 12:49 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*73.9*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 13C8-FOSA	*87.8*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: 18O2-PFHxS	*84.7*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: d5-N-EtFOSAA	*123*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
Surr: d3-N-MeFOSAA	*68.1*		*50-150*	*%REC*	1	5/25/2022 05:04 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 08:23 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 08:23 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 08:23 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 08:23 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 08:23 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 08:23 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 08:23 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 08:23 PM
Acetophenone	ND		3.8	µg/L	1	5/20/2022 08:23 PM
Anthracene	ND		19	µg/L	1	5/20/2022 08:23 PM
Atrazine	ND		3.8	µg/L	1	5/20/2022 08:23 PM
Benzaldehyde	ND		3.8	µg/L	1	5/20/2022 08:23 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 08:23 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 08:23 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 08:23 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-103 **Lab ID:** 22051511-03
Collection Date: 5/16/2022 12:49 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 08:23 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 08:23 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 08:23 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 08:23 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 08:23 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Caprolactam	ND		38	µg/L	1	5/20/2022 08:23 PM
Carbazole	ND		19	µg/L	1	5/20/2022 08:23 PM
Chrysene	ND		19	µg/L	1	5/20/2022 08:23 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 08:23 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 08:23 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 08:23 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 08:23 PM
Fluorene	ND		19	µg/L	1	5/20/2022 08:23 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 08:23 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 08:23 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 08:23 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 08:23 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 08:23 PM
Isophorone	ND		19	µg/L	1	5/20/2022 08:23 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 08:23 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 08:23 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 08:23 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 08:23 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 08:23 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 08:23 PM
Phenol	ND		19	µg/L	1	5/20/2022 08:23 PM
Pyrene	ND		19	µg/L	1	5/20/2022 08:23 PM
Surr: 2,4,6-Tribromophenol	*71.4*		*27-83*	*%REC*	1	5/20/2022 08:23 PM
Surr: 2-Fluorobiphenyl	*64.3*		*26-79*	*%REC*	1	5/20/2022 08:23 PM
Surr: 2-Fluorophenol	*42.6*		*13-56*	*%REC*	1	5/20/2022 08:23 PM
Surr: 4-Terphenyl-d14	*77.2*		*43-106*	*%REC*	1	5/20/2022 08:23 PM
Surr: Nitrobenzene-d5	*62.4*		*29-80*	*%REC*	1	5/20/2022 08:23 PM
Surr: Phenol-d6	*28.3*		*10-35*	*%REC*	1	5/20/2022 08:23 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-103 **Lab ID:** 22051511-03
Collection Date: 5/16/2022 12:49 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 12:43 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 12:43 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Acetone	ND		10	µg/L	1	5/20/2022 12:43 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 12:43 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 12:43 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 12:43 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 12:43 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-103 **Lab ID:** 22051511-03
Collection Date: 5/16/2022 12:49 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 12:43 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 12:43 AM
Surr: 1,2-Dichloroethane-d4	*98.2*		*75-120*	*%REC*	1	5/20/2022 12:43 AM
Surr: 4-Bromofluorobenzene	*98.0*		*80-110*	*%REC*	1	5/20/2022 12:43 AM
Surr: Dibromofluoromethane	*105*		*85-115*	*%REC*	1	5/20/2022 12:43 AM
Surr: Toluene-d8	*107*		*85-110*	*%REC*	1	5/20/2022 12:43 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 06:04 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 06:04 AM
Surr: Decachlorobiphenyl	*99.1*		*42-153*	*%REC*	1	5/21/2022 06:04 AM
Surr: Tetrachloro-m-xylene	*91.4*		*48-127*	*%REC*	1	5/21/2022 06:04 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:34 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.029**		**0.010**	**mg/L**	1	5/23/2022 07:22 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Barium	**0.086**		**0.0050**	**mg/L**	1	5/23/2022 07:22 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:22 PM
Boron	**0.025**		**0.020**	**mg/L**	1	5/23/2022 07:22 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:22 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:22 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 04:57 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorobutanesulfonic Acid (PFBS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorobutanoic Acid (PFBA)	**13**		**4.9**	**ng/L**	1	5/25/2022 05:13 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluoroheptanoic Acid (PFHpA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorohexanesulfonic Acid (PFHxS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorohexanoic Acid (PFHxA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorononanoic Acid (PFNA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		2.0	ng/L	1	5/25/2022 05:13 AM
Perfluorooctanoic Acid (PFOA)	ND		2.0	ng/L	1	5/25/2022 05:13 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 05:13 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.9	ng/L	1	5/25/2022 05:13 AM
11Cl-Pf3OUdS	ND		4.9	ng/L	1	5/25/2022 05:13 AM
9Cl-PF3ONS	ND		4.9	ng/L	1	5/25/2022 05:13 AM
Surr: 13C2-FtS 4:2	*112*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-FtS 6:2	*108*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-FtS 8:2	*115*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-PFDA	*86.9*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-PFDoA	*81.4*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-PFHxA	*87.9*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-PFTeA	*88.7*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C2-PFUnA	*96.5*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C3-HFPO-DA	*81.3*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C3-PFBS	*84.5*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C4-PFBA	*95.8*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C4-PFHpA	*94.4*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C4-PFOA	*96.6*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C4-PFOS	*85.8*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C5-PFNA	*117*		*50-150*	*%REC*	1	5/25/2022 05:13 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*91.5*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 13C8-FOSA	*121*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: 18O2-PFHxS	*109*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: d5-N-EtFOSAA	*129*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
Surr: d3-N-MeFOSAA	*92.0*		*50-150*	*%REC*	1	5/25/2022 05:13 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4,5-Trichlorophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4,6-Trichlorophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4-Dichlorophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4-Dimethylphenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4-Dinitrophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2,4-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 08:43 PM
2,6-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Chloronaphthalene	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Chlorophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Methylnaphthalene	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Methylphenol	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Nitroaniline	ND		20	µg/L	1	5/20/2022 08:43 PM
2-Nitrophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
3&4-Methylphenol	ND		20	µg/L	1	5/20/2022 08:43 PM
3,3´-Dichlorobenzidine	ND		20	µg/L	1	5/20/2022 08:43 PM
3-Nitroaniline	ND		20	µg/L	1	5/20/2022 08:43 PM
4,6-Dinitro-2-methylphenol	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Bromophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Chloro-3-methylphenol	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Chloroaniline	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Chlorophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Nitroaniline	ND		20	µg/L	1	5/20/2022 08:43 PM
4-Nitrophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
Acenaphthene	ND		20	µg/L	1	5/20/2022 08:43 PM
Acenaphthylene	ND		20	µg/L	1	5/20/2022 08:43 PM
Acetophenone	ND		4.1	µg/L	1	5/20/2022 08:43 PM
Anthracene	ND		20	µg/L	1	5/20/2022 08:43 PM
Atrazine	ND		4.1	µg/L	1	5/20/2022 08:43 PM
Benzaldehyde	ND		4.1	µg/L	1	5/20/2022 08:43 PM
Benzo(a)anthracene	ND		20	µg/L	1	5/20/2022 08:43 PM
Benzo(a)pyrene	ND		20	µg/L	1	5/20/2022 08:43 PM
Benzo(b)fluoranthene	ND		20	µg/L	1	5/20/2022 08:43 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		20	µg/L	1	5/20/2022 08:43 PM
Benzo(k)fluoranthene	ND		20	µg/L	1	5/20/2022 08:43 PM
Bis(2-chloroethoxy)methane	ND		20	µg/L	1	5/20/2022 08:43 PM
Bis(2-chloroethyl)ether	ND		20	µg/L	1	5/20/2022 08:43 PM
Bis(2-chloroisopropyl)ether	ND		20	µg/L	1	5/20/2022 08:43 PM
Bis(2-ethylhexyl)phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Butyl benzyl phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Caprolactam	ND		41	µg/L	1	5/20/2022 08:43 PM
Carbazole	ND		20	µg/L	1	5/20/2022 08:43 PM
Chrysene	ND		20	µg/L	1	5/20/2022 08:43 PM
Dibenzo(a,h)anthracene	ND		20	µg/L	1	5/20/2022 08:43 PM
Dibenzofuran	ND		20	µg/L	1	5/20/2022 08:43 PM
Diethyl phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Dimethyl phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Di-n-butyl phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Di-n-octyl phthalate	ND		20	µg/L	1	5/20/2022 08:43 PM
Fluoranthene	ND		20	µg/L	1	5/20/2022 08:43 PM
Fluorene	ND		20	µg/L	1	5/20/2022 08:43 PM
Hexachlorobenzene	ND		20	µg/L	1	5/20/2022 08:43 PM
Hexachlorobutadiene	ND		20	µg/L	1	5/20/2022 08:43 PM
Hexachlorocyclopentadiene	ND		20	µg/L	1	5/20/2022 08:43 PM
Hexachloroethane	ND		20	µg/L	1	5/20/2022 08:43 PM
Indeno(1,2,3-cd)pyrene	ND		20	µg/L	1	5/20/2022 08:43 PM
Isophorone	ND		20	µg/L	1	5/20/2022 08:43 PM
Naphthalene	ND		20	µg/L	1	5/20/2022 08:43 PM
Nitrobenzene	ND		20	µg/L	1	5/20/2022 08:43 PM
N-Nitrosodi-n-propylamine	ND		20	µg/L	1	5/20/2022 08:43 PM
N-Nitrosodiphenylamine	ND		20	µg/L	1	5/20/2022 08:43 PM
Pentachlorophenol	ND		20	µg/L	1	5/20/2022 08:43 PM
Phenanthrene	ND		20	µg/L	1	5/20/2022 08:43 PM
Phenol	ND		20	µg/L	1	5/20/2022 08:43 PM
Pyrene	ND		20	µg/L	1	5/20/2022 08:43 PM
Surr: 2,4,6-Tribromophenol	*63.4*		*27-83*	*%REC*	1	5/20/2022 08:43 PM
Surr: 2-Fluorobiphenyl	*61.9*		*26-79*	*%REC*	1	5/20/2022 08:43 PM
Surr: 2-Fluorophenol	*38.7*		*13-56*	*%REC*	1	5/20/2022 08:43 PM
Surr: 4-Terphenyl-d14	*75.3*		*43-106*	*%REC*	1	5/20/2022 08:43 PM
Surr: Nitrobenzene-d5	*60.6*		*29-80*	*%REC*	1	5/20/2022 08:43 PM
Surr: Phenol-d6	*25.6*		*10-35*	*%REC*	1	5/20/2022 08:43 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 01:01 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 01:01 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Acetone	ND		10	µg/L	1	5/20/2022 01:01 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 01:01 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 01:01 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 01:01 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 01:01 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-104 **Lab ID:** 22051511-04
Collection Date: 5/16/2022 01:02 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 01:01 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 01:01 AM
Surr: 1,2-Dichloroethane-d4	*100*		*75-120*	*%REC*	1	5/20/2022 01:01 AM
Surr: 4-Bromofluorobenzene	*90.6*		*80-110*	*%REC*	1	5/20/2022 01:01 AM
Surr: Dibromofluoromethane	*102*		*85-115*	*%REC*	1	5/20/2022 01:01 AM
Surr: Toluene-d8	*97.2*		*85-110*	*%REC*	1	5/20/2022 01:01 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 06:17 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 06:17 AM
Surr: Decachlorobiphenyl	*89.3*		*42-153*	*%REC*	1	5/21/2022 06:17 AM
Surr: Tetrachloro-m-xylene	*89.0*		*48-127*	*%REC*	1	5/21/2022 06:17 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:36 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	ND		0.010	mg/L	1	5/23/2022 07:23 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Arsenic	**0.016**		**0.0050**	**mg/L**	1	5/23/2022 07:23 PM
Barium	**0.14**		**0.0050**	**mg/L**	1	5/23/2022 07:23 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:23 PM
Boron	**0.028**		**0.020**	**mg/L**	1	5/23/2022 07:23 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:23 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:23 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:23 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorobutanesulfonic Acid (PFBS)	**11**		**4.8**	**ng/L**	1	5/25/2022 05:21 AM
Perfluorobutanoic Acid (PFBA)	**65**		**4.8**	**ng/L**	1	5/25/2022 05:21 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.8	ng/L	1	5/25/2022 05:21 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluoroheptanoic Acid (PFHpA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorohexanesulfonic Acid (PFHxS)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorohexanoic Acid (PFHxA)	**5.3**		**4.8**	**ng/L**	1	5/25/2022 05:21 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorononanoic Acid (PFNA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		1.9	ng/L	1	5/25/2022 05:21 AM
Perfluorooctanoic Acid (PFOA)	**5.8**		**1.9**	**ng/L**	1	5/25/2022 05:21 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluoropentanoic Acid (PFPeA)	**11**		**4.8**	**ng/L**	1	5/25/2022 05:21 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/25/2022 05:21 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.8	ng/L	1	5/25/2022 05:21 AM
11Cl-Pf3OUdS	ND		4.8	ng/L	1	5/25/2022 05:21 AM
9Cl-PF3ONS	ND		4.8	ng/L	1	5/25/2022 05:21 AM
Surr: 13C2-FtS 4:2	*171*	S	*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-FtS 6:2	*130*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-FtS 8:2	*113*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-PFDA	*90.1*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-PFDoA	*89.6*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-PFHxA	*104*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-PFTeA	*92.0*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C2-PFUnA	*91.1*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C3-HFPO-DA	*97.1*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C3-PFBS	*87.8*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C4-PFBA	*104*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C4-PFHpA	*87.6*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C4-PFOA	*92.6*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C4-PFOS	*91.3*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C5-PFNA	*110*		*50-150*	*%REC*	1	5/25/2022 05:21 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*97.0*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 13C8-FOSA	*98.1*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: 18O2-PFHxS	*93.7*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: d5-N-EtFOSAA	*118*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
Surr: d3-N-MeFOSAA	*95.2*		*50-150*	*%REC*	1	5/25/2022 05:21 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 09:04 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:04 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 09:04 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 09:04 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:04 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:04 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 09:04 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 09:04 PM
Acetophenone	ND		3.9	µg/L	1	5/20/2022 09:04 PM
Anthracene	ND		19	µg/L	1	5/20/2022 09:04 PM
Atrazine	ND		3.9	µg/L	1	5/20/2022 09:04 PM
Benzaldehyde	ND		3.9	µg/L	1	5/20/2022 09:04 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 09:04 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 09:04 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 09:04 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 09:04 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 09:04 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 09:04 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 09:04 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 09:04 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Caprolactam	ND		39	µg/L	1	5/20/2022 09:04 PM
Carbazole	ND		19	µg/L	1	5/20/2022 09:04 PM
Chrysene	ND		19	µg/L	1	5/20/2022 09:04 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 09:04 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 09:04 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 09:04 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 09:04 PM
Fluorene	ND		19	µg/L	1	5/20/2022 09:04 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 09:04 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 09:04 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 09:04 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 09:04 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 09:04 PM
Isophorone	ND		19	µg/L	1	5/20/2022 09:04 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 09:04 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 09:04 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 09:04 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 09:04 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 09:04 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 09:04 PM
Phenol	ND		19	µg/L	1	5/20/2022 09:04 PM
Pyrene	ND		19	µg/L	1	5/20/2022 09:04 PM
Surr: 2,4,6-Tribromophenol	*70.6*		*27-83*	*%REC*	1	5/20/2022 09:04 PM
Surr: 2-Fluorobiphenyl	*64.3*		*26-79*	*%REC*	1	5/20/2022 09:04 PM
Surr: 2-Fluorophenol	*39.6*		*13-56*	*%REC*	1	5/20/2022 09:04 PM
Surr: 4-Terphenyl-d14	*79.5*		*43-106*	*%REC*	1	5/20/2022 09:04 PM
Surr: Nitrobenzene-d5	*64.9*		*29-80*	*%REC*	1	5/20/2022 09:04 PM
Surr: Phenol-d6	*27.0*		*10-35*	*%REC*	1	5/20/2022 09:04 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 01:19 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 01:19 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Acetone	ND		10	µg/L	1	5/20/2022 01:19 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 01:19 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 01:19 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 01:19 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 01:19 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-105 **Lab ID:** 22051511-05
Collection Date: 5/16/2022 01:42 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 01:19 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 01:19 AM
Surr: 1,2-Dichloroethane-d4	*99.4*		*75-120*	*%REC*	1	5/20/2022 01:19 AM
Surr: 4-Bromofluorobenzene	*89.4*		*80-110*	*%REC*	1	5/20/2022 01:19 AM
Surr: Dibromofluoromethane	*98.6*		*85-115*	*%REC*	1	5/20/2022 01:19 AM
Surr: Toluene-d8	*104*		*85-110*	*%REC*	1	5/20/2022 01:19 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 06:30 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 06:30 AM
Surr: Decachlorobiphenyl	*106*		*42-153*	*%REC*	1	5/21/2022 06:30 AM
Surr: Tetrachloro-m-xylene	*91.8*		*48-127*	*%REC*	1	5/21/2022 06:30 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:38 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.011**		**0.010**	**mg/L**	1	5/23/2022 07:25 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Barium	**0.074**		**0.0050**	**mg/L**	1	5/23/2022 07:25 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:25 PM
Boron	**0.42**		**0.020**	**mg/L**	1	5/23/2022 07:25 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:25 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:25 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 04:58 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorobutanesulfonic Acid (PFBS)	**35**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorobutanoic Acid (PFBA)	**270**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		5.0	ng/L	1	5/25/2022 05:29 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorododecanoic Acid (PFDoA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluoroheptanoic Acid (PFHpA)	**25**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorohexanesulfonic Acid (PFHxS)	**29**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorohexanoic Acid (PFHxA)	**28**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorononanesulfonic Acid (PFNS)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorononanoic Acid (PFNA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorooctanesulfonamide (PFOSA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorooctanesulfonic Acid (PFOS)	**12**		**2.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorooctanoic Acid (PFOA)	**68**		**2.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluoropentanesulfonic Acid (PFPeS)	**18**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluoropentanoic Acid (PFPeA)	**11**		**5.0**	**ng/L**	1	5/25/2022 05:29 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluorotridecanoic Acid (PFTriA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Perfluoroundecanoic Acid (PFUnA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		5.0	ng/L	1	5/25/2022 05:29 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		5.0	ng/L	1	5/25/2022 05:29 AM
11Cl-Pf3OUdS	ND		5.0	ng/L	1	5/25/2022 05:29 AM
9Cl-PF3ONS	ND		5.0	ng/L	1	5/25/2022 05:29 AM
Surr: 13C2-FtS 4:2	*181*	S	*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-FtS 6:2	*138*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-FtS 8:2	*121*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-PFDA	*88.3*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-PFDoA	*81.5*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-PFHxA	*97.4*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-PFTeA	*98.1*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C2-PFUnA	*90.5*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C3-HFPO-DA	*96.1*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C3-PFBS	*85.7*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C4-PFBA	*95.3*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C4-PFHpA	*83.5*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C4-PFOA	*85.8*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C4-PFOS	*87.4*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C5-PFNA	*102*		*50-150*	*%REC*	1	5/25/2022 05:29 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*92.2*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 13C8-FOSA	*96.5*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: 18O2-PFHxS	*79.0*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: d5-N-EtFOSAA	*108*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
Surr: d3-N-MeFOSAA	*95.8*		*50-150*	*%REC*	1	5/25/2022 05:29 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 09:25 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:25 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 09:25 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 09:25 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:25 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 09:25 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 09:25 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 09:25 PM
Acetophenone	ND		3.7	µg/L	1	5/20/2022 09:25 PM
Anthracene	ND		19	µg/L	1	5/20/2022 09:25 PM
Atrazine	ND		3.7	µg/L	1	5/20/2022 09:25 PM
Benzaldehyde	ND		3.7	µg/L	1	5/20/2022 09:25 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 09:25 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 09:25 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 09:25 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 09:25 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 09:25 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 09:25 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 09:25 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 09:25 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Caprolactam	ND		37	µg/L	1	5/20/2022 09:25 PM
Carbazole	ND		19	µg/L	1	5/20/2022 09:25 PM
Chrysene	ND		19	µg/L	1	5/20/2022 09:25 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 09:25 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 09:25 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 09:25 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 09:25 PM
Fluorene	ND		19	µg/L	1	5/20/2022 09:25 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 09:25 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 09:25 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 09:25 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 09:25 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 09:25 PM
Isophorone	ND		19	µg/L	1	5/20/2022 09:25 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 09:25 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 09:25 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 09:25 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 09:25 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 09:25 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 09:25 PM
Phenol	ND		19	µg/L	1	5/20/2022 09:25 PM
Pyrene	ND		19	µg/L	1	5/20/2022 09:25 PM
Surr: 2,4,6-Tribromophenol	*68.1*		*27-83*	*%REC*	1	5/20/2022 09:25 PM
Surr: 2-Fluorobiphenyl	*63.4*		*26-79*	*%REC*	1	5/20/2022 09:25 PM
Surr: 2-Fluorophenol	*42.2*		*13-56*	*%REC*	1	5/20/2022 09:25 PM
Surr: 4-Terphenyl-d14	*83.0*		*43-106*	*%REC*	1	5/20/2022 09:25 PM
Surr: Nitrobenzene-d5	*63.2*		*29-80*	*%REC*	1	5/20/2022 09:25 PM
Surr: Phenol-d6	*27.8*		*10-35*	*%REC*	1	5/20/2022 09:25 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 01:38 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 01:38 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Acetone	ND		10	µg/L	1	5/20/2022 01:38 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 01:38 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 01:38 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 01:38 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 01:38 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-106 **Lab ID:** 22051511-06
Collection Date: 5/16/2022 02:10 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 01:38 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 01:38 AM
Surr: 1,2-Dichloroethane-d4	*95.1*		*75-120*	*%REC*	1	5/20/2022 01:38 AM
Surr: 4-Bromofluorobenzene	*90.6*		*80-110*	*%REC*	1	5/20/2022 01:38 AM
Surr: Dibromofluoromethane	*100*		*85-115*	*%REC*	1	5/20/2022 01:38 AM
Surr: Toluene-d8	*100*		*85-110*	*%REC*	1	5/20/2022 01:38 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 06:43 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 06:43 AM
Surr: Decachlorobiphenyl	*93.1*		*42-153*	*%REC*	1	5/21/2022 06:43 AM
Surr: Tetrachloro-m-xylene	*90.1*		*48-127*	*%REC*	1	5/21/2022 06:43 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:40 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.032**		**0.010**	**mg/L**	1	5/23/2022 07:27 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Arsenic	**0.0096**		**0.0050**	**mg/L**	1	5/23/2022 07:27 PM
Barium	**0.30**		**0.0050**	**mg/L**	1	5/23/2022 07:27 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:27 PM
Boron	**0.11**		**0.020**	**mg/L**	1	5/23/2022 07:27 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:27 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:27 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 05:00 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/20/22 18:04	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorobutanesulfonic Acid (PFBS)	**6.1**		**4.6**	**ng/L**	1	5/25/2022 05:37 AM
Perfluorobutanoic Acid (PFBA)	**9.0**		**4.6**	**ng/L**	1	5/25/2022 05:37 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.6	ng/L	1	5/25/2022 05:37 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluoroheptanoic Acid (PFHpA)	**5.0**		**4.6**	**ng/L**	1	5/25/2022 05:37 AM
Perfluorohexanesulfonic Acid (PFHxS)	**15**		**4.6**	**ng/L**	1	5/25/2022 05:37 AM
Perfluorohexanoic Acid (PFHxA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorononanoic Acid (PFNA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorooctanesulfonic Acid (PFOS)	**3.2**		**1.9**	**ng/L**	1	5/25/2022 05:37 AM
Perfluorooctanoic Acid (PFOA)	**16**		**1.9**	**ng/L**	1	5/25/2022 05:37 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.6	ng/L	1	5/25/2022 05:37 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.6	ng/L	1	5/25/2022 05:37 AM
11Cl-Pf3OUdS	ND		4.6	ng/L	1	5/25/2022 05:37 AM
9Cl-PF3ONS	ND		4.6	ng/L	1	5/25/2022 05:37 AM
Surr: 13C2-FtS 4:2	*99.2*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-FtS 6:2	*109*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-FtS 8:2	*125*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-PFDA	*85.6*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-PFDoA	*73.5*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-PFHxA	*95.3*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-PFTeA	*88.7*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C2-PFUnA	*80.6*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C3-HFPO-DA	*95.1*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C3-PFBS	*84.5*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C4-PFBA	*92.3*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C4-PFHpA	*78.6*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C4-PFOA	*82.1*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C4-PFOS	*86.3*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C5-PFNA	*94.9*		*50-150*	*%REC*	1	5/25/2022 05:37 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*86.5*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 13C8-FOSA	*76.6*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: 18O2-PFHxS	*81.2*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: d5-N-EtFOSAA	*99.8*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
Surr: d3-N-MeFOSAA	*87.6*		*50-150*	*%REC*	1	5/25/2022 05:37 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4,5-Trichlorophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4,6-Trichlorophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4-Dichlorophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4-Dimethylphenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4-Dinitrophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2,4-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 09:45 PM
2,6-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Chloronaphthalene	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Chlorophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Methylnaphthalene	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Methylphenol	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Nitroaniline	ND		20	µg/L	1	5/20/2022 09:45 PM
2-Nitrophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
3&4-Methylphenol	ND		20	µg/L	1	5/20/2022 09:45 PM
3,3´-Dichlorobenzidine	ND		20	µg/L	1	5/20/2022 09:45 PM
3-Nitroaniline	ND		20	µg/L	1	5/20/2022 09:45 PM
4,6-Dinitro-2-methylphenol	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Bromophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Chloro-3-methylphenol	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Chloroaniline	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Chlorophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Nitroaniline	ND		20	µg/L	1	5/20/2022 09:45 PM
4-Nitrophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
Acenaphthene	ND		20	µg/L	1	5/20/2022 09:45 PM
Acenaphthylene	ND		20	µg/L	1	5/20/2022 09:45 PM
Acetophenone	ND		3.9	µg/L	1	5/20/2022 09:45 PM
Anthracene	ND		20	µg/L	1	5/20/2022 09:45 PM
Atrazine	ND		3.9	µg/L	1	5/20/2022 09:45 PM
Benzaldehyde	ND		3.9	µg/L	1	5/20/2022 09:45 PM
Benzo(a)anthracene	ND		20	µg/L	1	5/20/2022 09:45 PM
Benzo(a)pyrene	ND		20	µg/L	1	5/20/2022 09:45 PM
Benzo(b)fluoranthene	ND		20	µg/L	1	5/20/2022 09:45 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		20	µg/L	1	5/20/2022 09:45 PM
Benzo(k)fluoranthene	ND		20	µg/L	1	5/20/2022 09:45 PM
Bis(2-chloroethoxy)methane	ND		20	µg/L	1	5/20/2022 09:45 PM
Bis(2-chloroethyl)ether	ND		20	µg/L	1	5/20/2022 09:45 PM
Bis(2-chloroisopropyl)ether	ND		20	µg/L	1	5/20/2022 09:45 PM
Bis(2-ethylhexyl)phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Butyl benzyl phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Caprolactam	ND		39	µg/L	1	5/20/2022 09:45 PM
Carbazole	ND		20	µg/L	1	5/20/2022 09:45 PM
Chrysene	ND		20	µg/L	1	5/20/2022 09:45 PM
Dibenzo(a,h)anthracene	ND		20	µg/L	1	5/20/2022 09:45 PM
Dibenzofuran	ND		20	µg/L	1	5/20/2022 09:45 PM
Diethyl phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Dimethyl phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Di-n-butyl phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Di-n-octyl phthalate	ND		20	µg/L	1	5/20/2022 09:45 PM
Fluoranthene	ND		20	µg/L	1	5/20/2022 09:45 PM
Fluorene	ND		20	µg/L	1	5/20/2022 09:45 PM
Hexachlorobenzene	ND		20	µg/L	1	5/20/2022 09:45 PM
Hexachlorobutadiene	ND		20	µg/L	1	5/20/2022 09:45 PM
Hexachlorocyclopentadiene	ND		20	µg/L	1	5/20/2022 09:45 PM
Hexachloroethane	ND		20	µg/L	1	5/20/2022 09:45 PM
Indeno(1,2,3-cd)pyrene	ND		20	µg/L	1	5/20/2022 09:45 PM
Isophorone	ND		20	µg/L	1	5/20/2022 09:45 PM
Naphthalene	ND		20	µg/L	1	5/20/2022 09:45 PM
Nitrobenzene	ND		20	µg/L	1	5/20/2022 09:45 PM
N-Nitrosodi-n-propylamine	ND		20	µg/L	1	5/20/2022 09:45 PM
N-Nitrosodiphenylamine	ND		20	µg/L	1	5/20/2022 09:45 PM
Pentachlorophenol	ND		20	µg/L	1	5/20/2022 09:45 PM
Phenanthrene	ND		20	µg/L	1	5/20/2022 09:45 PM
Phenol	ND		20	µg/L	1	5/20/2022 09:45 PM
Pyrene	ND		20	µg/L	1	5/20/2022 09:45 PM
Surr: 2,4,6-Tribromophenol	*62.8*		*27-83*	*%REC*	1	5/20/2022 09:45 PM
Surr: 2-Fluorobiphenyl	*61.1*		*26-79*	*%REC*	1	5/20/2022 09:45 PM
Surr: 2-Fluorophenol	*43.7*		*13-56*	*%REC*	1	5/20/2022 09:45 PM
Surr: 4-Terphenyl-d14	*71.8*		*43-106*	*%REC*	1	5/20/2022 09:45 PM
Surr: Nitrobenzene-d5	*61.4*		*29-80*	*%REC*	1	5/20/2022 09:45 PM
Surr: Phenol-d6	*28.7*		*10-35*	*%REC*	1	5/20/2022 09:45 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 01:56 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 01:56 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Acetone	ND		10	µg/L	1	5/20/2022 01:56 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 01:56 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 01:56 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 01:56 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 01:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-200 **Lab ID:** 22051511-07
Collection Date: 5/16/2022 03:55 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 01:56 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 01:56 AM
Surr: 1,2-Dichloroethane-d4	*100*		*75-120*	*%REC*	1	5/20/2022 01:56 AM
Surr: 4-Bromofluorobenzene	*88.8*		*80-110*	*%REC*	1	5/20/2022 01:56 AM
Surr: Dibromofluoromethane	*104*		*85-115*	*%REC*	1	5/20/2022 01:56 AM
Surr: Toluene-d8	*97.2*		*85-110*	*%REC*	1	5/20/2022 01:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 06:56 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 06:56 AM
Surr: Decachlorobiphenyl	*112*		*42-153*	*%REC*	1	5/21/2022 06:56 AM
Surr: Tetrachloro-m-xylene	*96.4*		*48-127*	*%REC*	1	5/21/2022 06:56 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:42 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	ND		0.010	mg/L	1	5/23/2022 07:28 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Barium	**0.12**		**0.0050**	**mg/L**	1	5/23/2022 07:28 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:28 PM
Boron	**0.088**		**0.020**	**mg/L**	1	5/23/2022 07:28 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:28 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:28 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:28 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorobutanesulfonic Acid (PFBS)	**17**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluorobutanoic Acid (PFBA)	**10**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.9	ng/L	1	5/25/2022 08:15 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluoroheptanoic Acid (PFHpA)	**7.4**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluorohexanesulfonic Acid (PFHxS)	**19**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluorohexanoic Acid (PFHxA)	**5.4**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorononanoic Acid (PFNA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		2.0	ng/L	1	5/25/2022 08:15 AM
Perfluorooctanoic Acid (PFOA)	**25**		**2.0**	**ng/L**	1	5/25/2022 08:15 AM
Perfluoropentanesulfonic Acid (PFPeS)	**5.8**		**4.9**	**ng/L**	1	5/25/2022 08:15 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 08:15 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.9	ng/L	1	5/25/2022 08:15 AM
11Cl-Pf3OUdS	ND		4.9	ng/L	1	5/25/2022 08:15 AM
9Cl-PF3ONS	ND		4.9	ng/L	1	5/25/2022 08:15 AM
Surr: 13C2-FtS 4:2	*91.9*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-FtS 6:2	*83.2*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-FtS 8:2	*70.6*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-PFDA	*61.0*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-PFDoA	*55.6*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-PFHxA	*68.5*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-PFTeA	*73.8*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C2-PFUnA	*87.0*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C3-HFPO-DA	*71.3*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C3-PFBS	*93.8*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C4-PFBA	*91.1*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C4-PFHpA	*105*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C4-PFOA	*94.0*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C4-PFOS	*75.6*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C5-PFNA	*86.4*		*50-150*	*%REC*	1	5/25/2022 08:15 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*83.3*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 13C8-FOSA	*80.6*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: 18O2-PFHxS	*93.5*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: d5-N-EtFOSAA	*81.1*		*50-150*	*%REC*	1	5/25/2022 08:15 AM
Surr: d3-N-MeFOSAA	*47.2*	S	*50-150*	*%REC*	1	5/25/2022 08:15 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 10:06 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:06 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 10:06 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 10:06 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:06 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:06 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 10:06 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 10:06 PM
Acetophenone	ND		3.8	µg/L	1	5/20/2022 10:06 PM
Anthracene	ND		19	µg/L	1	5/20/2022 10:06 PM
Atrazine	ND		3.8	µg/L	1	5/20/2022 10:06 PM
Benzaldehyde	ND		3.8	µg/L	1	5/20/2022 10:06 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 10:06 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 10:06 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 10:06 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 10:06 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 10:06 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 10:06 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 10:06 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 10:06 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Caprolactam	ND		38	µg/L	1	5/20/2022 10:06 PM
Carbazole	ND		19	µg/L	1	5/20/2022 10:06 PM
Chrysene	ND		19	µg/L	1	5/20/2022 10:06 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 10:06 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 10:06 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 10:06 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 10:06 PM
Fluorene	ND		19	µg/L	1	5/20/2022 10:06 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 10:06 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 10:06 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 10:06 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 10:06 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 10:06 PM
Isophorone	ND		19	µg/L	1	5/20/2022 10:06 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 10:06 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 10:06 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 10:06 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 10:06 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 10:06 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 10:06 PM
Phenol	ND		19	µg/L	1	5/20/2022 10:06 PM
Pyrene	ND		19	µg/L	1	5/20/2022 10:06 PM
Surr: 2,4,6-Tribromophenol	*68.7*		*27-83*	*%REC*	1	5/20/2022 10:06 PM
Surr: 2-Fluorobiphenyl	*67.6*		*26-79*	*%REC*	1	5/20/2022 10:06 PM
Surr: 2-Fluorophenol	*46.8*		*13-56*	*%REC*	1	5/20/2022 10:06 PM
Surr: 4-Terphenyl-d14	*79.6*		*43-106*	*%REC*	1	5/20/2022 10:06 PM
Surr: Nitrobenzene-d5	*67.2*		*29-80*	*%REC*	1	5/20/2022 10:06 PM
Surr: Phenol-d6	*30.9*		*10-35*	*%REC*	1	5/20/2022 10:06 PM
VOLATILE ORGANIC COMPOUNDS			**SW8260C**			Analyst: **HJ**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 02:41 PM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 02:41 PM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Acetone	ND		10	µg/L	1	5/20/2022 02:41 PM
Benzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Bromoform	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Chloroform	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 02:41 PM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 02:41 PM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 02:41 PM
Styrene	ND		1.0	µg/L	1	5/20/2022 02:41 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-201 **Lab ID:** 22051511-08
Collection Date: 5/16/2022 04:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Toluene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 02:41 PM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 02:41 PM
Surr: 1,2-Dichloroethane-d4	*104*		*75-120*	*%REC*	1	5/20/2022 02:41 PM
Surr: 4-Bromofluorobenzene	*93.2*		*80-110*	*%REC*	1	5/20/2022 02:41 PM
Surr: Dibromofluoromethane	*99.4*		*85-115*	*%REC*	1	5/20/2022 02:41 PM
Surr: Toluene-d8	*98.6*		*85-110*	*%REC*	1	5/20/2022 02:41 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 07:08 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 07:08 AM
Surr: Decachlorobiphenyl	*59.0*		*42-153*	*%REC*	1	5/21/2022 07:08 AM
Surr: Tetrachloro-m-xylene	*84.5*		*48-127*	*%REC*	1	5/21/2022 07:08 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:43 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.015**		**0.010**	**mg/L**	1	5/23/2022 07:30 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Barium	**0.38**		**0.0050**	**mg/L**	1	5/23/2022 07:30 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:30 PM
Boron	**0.69**		**0.020**	**mg/L**	1	5/23/2022 07:30 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:30 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Nickel	**0.0056**		**0.0050**	**mg/L**	1	5/23/2022 07:30 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:30 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:30 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluorobutanesulfonic Acid (PFBS)	**22**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorobutanoic Acid (PFBA)	**470**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		5.1	ng/L	1	5/25/2022 08:23 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluorododecanoic Acid (PFDoA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluoroheptanesulfonic Acid (PFHpS)	**7.5**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluoroheptanoic Acid (PFHpA)	**45**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorohexanesulfonic Acid (PFHxS)	**71**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorohexanoic Acid (PFHxA)	**38**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorononanesulfonic Acid (PFNS)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluorononanoic Acid (PFNA)	**8.2**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorooctanesulfonamide (PFOSA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluorooctanesulfonic Acid (PFOS)	**100**		**2.0**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorooctanoic Acid (PFOA)	**170**		**2.0**	**ng/L**	1	5/25/2022 08:23 AM
Perfluoropentanesulfonic Acid (PFPeS)	**19**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluoropentanoic Acid (PFPeA)	**12**		**5.1**	**ng/L**	1	5/25/2022 08:23 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluorotridecanoic Acid (PFTriA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Perfluoroundecanoic Acid (PFUnA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		5.1	ng/L	1	5/25/2022 08:23 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		5.1	ng/L	1	5/25/2022 08:23 AM
11Cl-Pf3OUdS	ND		5.1	ng/L	1	5/25/2022 08:23 AM
9Cl-PF3ONS	ND		5.1	ng/L	1	5/25/2022 08:23 AM
Surr: 13C2-FtS 4:2	*325*	S	*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-FtS 6:2	*357*	S	*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-FtS 8:2	*133*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-PFDA	*80.9*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-PFDoA	*74.2*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-PFHxA	*78.6*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-PFTeA	*86.0*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C2-PFUnA	*77.9*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C3-HFPO-DA	*72.6*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C3-PFBS	*71.7*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C4-PFBA	*83.3*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C4-PFHpA	*74.2*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C4-PFOA	*90.0*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C4-PFOS	*79.1*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C5-PFNA	*108*		*50-150*	*%REC*	1	5/25/2022 08:23 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*74.1*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 13C8-FOSA	*72.6*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: 18O2-PFHxS	*78.7*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: d5-N-EtFOSAA	*71.1*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
Surr: d3-N-MeFOSAA	*63.0*		*50-150*	*%REC*	1	5/25/2022 08:23 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 10:26 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:26 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 10:26 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 10:26 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:26 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 10:26 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 10:26 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 10:26 PM
Acetophenone	ND		3.7	µg/L	1	5/20/2022 10:26 PM
Anthracene	ND		19	µg/L	1	5/20/2022 10:26 PM
Atrazine	ND		3.7	µg/L	1	5/20/2022 10:26 PM
Benzaldehyde	ND		3.7	µg/L	1	5/20/2022 10:26 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 10:26 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 10:26 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 10:26 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 10:26 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 10:26 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 10:26 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 10:26 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 10:26 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Caprolactam	ND		37	µg/L	1	5/20/2022 10:26 PM
Carbazole	ND		19	µg/L	1	5/20/2022 10:26 PM
Chrysene	ND		19	µg/L	1	5/20/2022 10:26 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 10:26 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 10:26 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 10:26 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 10:26 PM
Fluorene	ND		19	µg/L	1	5/20/2022 10:26 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 10:26 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 10:26 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 10:26 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 10:26 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 10:26 PM
Isophorone	ND		19	µg/L	1	5/20/2022 10:26 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 10:26 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 10:26 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 10:26 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 10:26 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 10:26 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 10:26 PM
Phenol	ND		19	µg/L	1	5/20/2022 10:26 PM
Pyrene	ND		19	µg/L	1	5/20/2022 10:26 PM
Surr: 2,4,6-Tribromophenol	*71.7*		*27-83*	*%REC*	1	5/20/2022 10:26 PM
Surr: 2-Fluorobiphenyl	*61.4*		*26-79*	*%REC*	1	5/20/2022 10:26 PM
Surr: 2-Fluorophenol	*36.4*		*13-56*	*%REC*	1	5/20/2022 10:26 PM
Surr: 4-Terphenyl-d14	*82.1*		*43-106*	*%REC*	1	5/20/2022 10:26 PM
Surr: Nitrobenzene-d5	*57.4*		*29-80*	*%REC*	1	5/20/2022 10:26 PM
Surr: Phenol-d6	*24.2*		*10-35*	*%REC*	1	5/20/2022 10:26 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 02:33 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 02:33 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Acetone	ND		10	µg/L	1	5/20/2022 02:33 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Chlorobenzene	**6.1**		**1.0**	**µg/L**	1	5/20/2022 02:33 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 02:33 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 02:33 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 02:33 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 02:33 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-202 **Lab ID:** 22051511-09
Collection Date: 5/16/2022 11:45 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 02:33 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 02:33 AM
Surr: 1,2-Dichloroethane-d4	*99.0*		*75-120*	*%REC*	1	5/20/2022 02:33 AM
Surr: 4-Bromofluorobenzene	*89.5*		*80-110*	*%REC*	1	5/20/2022 02:33 AM
Surr: Dibromofluoromethane	*102*		*85-115*	*%REC*	1	5/20/2022 02:33 AM
Surr: Toluene-d8	*99.4*		*85-110*	*%REC*	1	5/20/2022 02:33 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 07:47 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 07:47 AM
Surr: Decachlorobiphenyl	*68.1*		*42-153*	*%REC*	1	5/21/2022 07:47 AM
Surr: Tetrachloro-m-xylene	*86.5*		*48-127*	*%REC*	1	5/21/2022 07:47 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:45 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.046**		**0.010**	**mg/L**	1	5/23/2022 07:32 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Barium	**0.27**		**0.0050**	**mg/L**	1	5/23/2022 07:32 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:32 PM
Boron	**0.46**		**0.020**	**mg/L**	1	5/23/2022 07:32 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:32 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:32 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 05:02 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluorobutanesulfonic Acid (PFBS)	**13**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorobutanoic Acid (PFBA)	**44**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		5.1	ng/L	1	5/25/2022 08:32 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluorododecanoic Acid (PFDoA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluoroheptanesulfonic Acid (PFHpS)	**7.0**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluoroheptanoic Acid (PFHpA)	**51**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorohexanesulfonic Acid (PFHxS)	**72**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorohexanoic Acid (PFHxA)	**37**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorononanesulfonic Acid (PFNS)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluorononanoic Acid (PFNA)	**9.0**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorooctanesulfonamide (PFOSA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluorooctanesulfonic Acid (PFOS)	**50**		**2.0**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorooctanoic Acid (PFOA)	**250**		**2.0**	**ng/L**	1	5/25/2022 08:32 AM
Perfluoropentanesulfonic Acid (PFPeS)	**20**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluoropentanoic Acid (PFPeA)	**22**		**5.1**	**ng/L**	1	5/25/2022 08:32 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluorotridecanoic Acid (PFTriA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Perfluoroundecanoic Acid (PFUnA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		5.1	ng/L	1	5/25/2022 08:32 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		5.1	ng/L	1	5/25/2022 08:32 AM
11Cl-Pf3OUdS	ND		5.1	ng/L	1	5/25/2022 08:32 AM
9Cl-PF3ONS	ND		5.1	ng/L	1	5/25/2022 08:32 AM
Surr: 13C2-FtS 4:2	*285*	S	*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-FtS 6:2	*198*	S	*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-FtS 8:2	*86.9*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-PFDA	*74.5*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-PFDoA	*74.3*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-PFHxA	*104*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-PFTeA	*78.9*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C2-PFUnA	*73.8*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C3-HFPO-DA	*97.6*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C3-PFBS	*90.0*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C4-PFBA	*103*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C4-PFHpA	*89.3*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C4-PFOA	*94.4*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C4-PFOS	*84.6*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C5-PFNA	*92.9*		*50-150*	*%REC*	1	5/25/2022 08:32 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*92.9*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 13C8-FOSA	*74.0*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: 18O2-PFHxS	*87.9*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: d5-N-EtFOSAA	*63.8*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
Surr: d3-N-MeFOSAA	*60.0*		*50-150*	*%REC*	1	5/25/2022 08:32 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4,5-Trichlorophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4,6-Trichlorophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4-Dichlorophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4-Dimethylphenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4-Dinitrophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2,4-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 10:47 PM
2,6-Dinitrotoluene	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Chloronaphthalene	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Chlorophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Methylnaphthalene	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Methylphenol	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Nitroaniline	ND		20	µg/L	1	5/20/2022 10:47 PM
2-Nitrophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
3&4-Methylphenol	ND		20	µg/L	1	5/20/2022 10:47 PM
3,3´-Dichlorobenzidine	ND		20	µg/L	1	5/20/2022 10:47 PM
3-Nitroaniline	ND		20	µg/L	1	5/20/2022 10:47 PM
4,6-Dinitro-2-methylphenol	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Bromophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Chloro-3-methylphenol	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Chloroaniline	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Chlorophenyl phenyl ether	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Nitroaniline	ND		20	µg/L	1	5/20/2022 10:47 PM
4-Nitrophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
Acenaphthene	ND		20	µg/L	1	5/20/2022 10:47 PM
Acenaphthylene	ND		20	µg/L	1	5/20/2022 10:47 PM
Acetophenone	ND		3.9	µg/L	1	5/20/2022 10:47 PM
Anthracene	ND		20	µg/L	1	5/20/2022 10:47 PM
Atrazine	ND		3.9	µg/L	1	5/20/2022 10:47 PM
Benzaldehyde	ND		3.9	µg/L	1	5/20/2022 10:47 PM
Benzo(a)anthracene	ND		20	µg/L	1	5/20/2022 10:47 PM
Benzo(a)pyrene	ND		20	µg/L	1	5/20/2022 10:47 PM
Benzo(b)fluoranthene	ND		20	µg/L	1	5/20/2022 10:47 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		20	µg/L	1	5/20/2022 10:47 PM
Benzo(k)fluoranthene	ND		20	µg/L	1	5/20/2022 10:47 PM
Bis(2-chloroethoxy)methane	ND		20	µg/L	1	5/20/2022 10:47 PM
Bis(2-chloroethyl)ether	ND		20	µg/L	1	5/20/2022 10:47 PM
Bis(2-chloroisopropyl)ether	ND		20	µg/L	1	5/20/2022 10:47 PM
Bis(2-ethylhexyl)phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Butyl benzyl phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Caprolactam	ND		39	µg/L	1	5/20/2022 10:47 PM
Carbazole	ND		20	µg/L	1	5/20/2022 10:47 PM
Chrysene	ND		20	µg/L	1	5/20/2022 10:47 PM
Dibenzo(a,h)anthracene	ND		20	µg/L	1	5/20/2022 10:47 PM
Dibenzofuran	ND		20	µg/L	1	5/20/2022 10:47 PM
Diethyl phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Dimethyl phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Di-n-butyl phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Di-n-octyl phthalate	ND		20	µg/L	1	5/20/2022 10:47 PM
Fluoranthene	ND		20	µg/L	1	5/20/2022 10:47 PM
Fluorene	ND		20	µg/L	1	5/20/2022 10:47 PM
Hexachlorobenzene	ND		20	µg/L	1	5/20/2022 10:47 PM
Hexachlorobutadiene	ND		20	µg/L	1	5/20/2022 10:47 PM
Hexachlorocyclopentadiene	ND		20	µg/L	1	5/20/2022 10:47 PM
Hexachloroethane	ND		20	µg/L	1	5/20/2022 10:47 PM
Indeno(1,2,3-cd)pyrene	ND		20	µg/L	1	5/20/2022 10:47 PM
Isophorone	ND		20	µg/L	1	5/20/2022 10:47 PM
Naphthalene	ND		20	µg/L	1	5/20/2022 10:47 PM
Nitrobenzene	ND		20	µg/L	1	5/20/2022 10:47 PM
N-Nitrosodi-n-propylamine	ND		20	µg/L	1	5/20/2022 10:47 PM
N-Nitrosodiphenylamine	ND		20	µg/L	1	5/20/2022 10:47 PM
Pentachlorophenol	ND		20	µg/L	1	5/20/2022 10:47 PM
Phenanthrene	ND		20	µg/L	1	5/20/2022 10:47 PM
Phenol	ND		20	µg/L	1	5/20/2022 10:47 PM
Pyrene	ND		20	µg/L	1	5/20/2022 10:47 PM
Surr: 2,4,6-Tribromophenol	*75.5*		*27-83*	*%REC*	1	5/20/2022 10:47 PM
Surr: 2-Fluorobiphenyl	*73.2*		*26-79*	*%REC*	1	5/20/2022 10:47 PM
Surr: 2-Fluorophenol	*46.2*		*13-56*	*%REC*	1	5/20/2022 10:47 PM
Surr: 4-Terphenyl-d14	*86.2*		*43-106*	*%REC*	1	5/20/2022 10:47 PM
Surr: Nitrobenzene-d5	*72.0*		*29-80*	*%REC*	1	5/20/2022 10:47 PM
Surr: Phenol-d6	*30.6*		*10-35*	*%REC*	1	5/20/2022 10:47 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 02:51 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 02:51 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Acetone	ND		10	µg/L	1	5/20/2022 02:51 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 02:51 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 02:51 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 02:51 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 02:51 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-10-20 **Lab ID:** 22051511-10
Collection Date: 5/16/2022 03:53 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 02:51 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 02:51 AM
Surr: 1,2-Dichloroethane-d4	*98.4*		*75-120*	*%REC*	1	5/20/2022 02:51 AM
Surr: 4-Bromofluorobenzene	*87.4*		*80-110*	*%REC*	1	5/20/2022 02:51 AM
Surr: Dibromofluoromethane	*104*		*85-115*	*%REC*	1	5/20/2022 02:51 AM
Surr: Toluene-d8	*96.6*		*85-110*	*%REC*	1	5/20/2022 02:51 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 08:00 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 08:00 AM
Surr: Decachlorobiphenyl	*83.1*		*42-153*	*%REC*	1	5/21/2022 08:00 AM
Surr: Tetrachloro-m-xylene	*83.6*		*48-127*	*%REC*	1	5/21/2022 08:00 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:52 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.029**		**0.010**	**mg/L**	1	5/23/2022 07:34 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Barium	**0.14**		**0.0050**	**mg/L**	1	5/23/2022 07:34 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:34 PM
Boron	**0.11**		**0.020**	**mg/L**	1	5/23/2022 07:34 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:34 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:34 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 05:03 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorobutanesulfonic Acid (PFBS)	**7.2**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorobutanoic Acid (PFBA)	**30**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		5.2	ng/L	1	5/25/2022 08:40 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorododecanoic Acid (PFDoA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluoroheptanoic Acid (PFHpA)	**16**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorohexanesulfonic Acid (PFHxS)	**28**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorohexanoic Acid (PFHxA)	**13**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorononanesulfonic Acid (PFNS)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorononanoic Acid (PFNA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorooctanesulfonamide (PFOSA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorooctanesulfonic Acid (PFOS)	**11**		**2.1**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorooctanoic Acid (PFOA)	**57**		**2.1**	**ng/L**	1	5/25/2022 08:40 AM
Perfluoropentanesulfonic Acid (PFPeS)	**6.5**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluoropentanoic Acid (PFPeA)	**10**		**5.2**	**ng/L**	1	5/25/2022 08:40 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluorotridecanoic Acid (PFTriA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Perfluoroundecanoic Acid (PFUnA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		5.2	ng/L	1	5/25/2022 08:40 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		5.2	ng/L	1	5/25/2022 08:40 AM
11Cl-Pf3OUdS	ND		5.2	ng/L	1	5/25/2022 08:40 AM
9Cl-PF3ONS	ND		5.2	ng/L	1	5/25/2022 08:40 AM
Surr: 13C2-FtS 4:2	*325*	S	*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-FtS 6:2	*195*	S	*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-FtS 8:2	*98.9*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-PFDA	*88.6*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-PFDoA	*83.5*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-PFHxA	*119*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-PFTeA	*90.7*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C2-PFUnA	*90.6*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C3-HFPO-DA	*108*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C3-PFBS	*102*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C4-PFBA	*118*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C4-PFHpA	*101*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C4-PFOA	*102*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C4-PFOS	*99.8*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C5-PFNA	*111*		*50-150*	*%REC*	1	5/25/2022 08:40 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*106*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 13C8-FOSA	*97.4*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: 18O2-PFHxS	*112*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: d5-N-EtFOSAA	*91.9*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
Surr: d3-N-MeFOSAA	*70.9*		*50-150*	*%REC*	1	5/25/2022 08:40 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4,5-Trichlorophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4,6-Trichlorophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4-Dichlorophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4-Dimethylphenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4-Dinitrophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2,4-Dinitrotoluene	ND		21	µg/L	1	5/20/2022 11:08 PM
2,6-Dinitrotoluene	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Chloronaphthalene	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Chlorophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Methylnaphthalene	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Methylphenol	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Nitroaniline	ND		21	µg/L	1	5/20/2022 11:08 PM
2-Nitrophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
3&4-Methylphenol	ND		21	µg/L	1	5/20/2022 11:08 PM
3,3´-Dichlorobenzidine	ND		21	µg/L	1	5/20/2022 11:08 PM
3-Nitroaniline	ND		21	µg/L	1	5/20/2022 11:08 PM
4,6-Dinitro-2-methylphenol	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Bromophenyl phenyl ether	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Chloro-3-methylphenol	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Chloroaniline	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Chlorophenyl phenyl ether	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Nitroaniline	ND		21	µg/L	1	5/20/2022 11:08 PM
4-Nitrophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
Acenaphthene	ND		21	µg/L	1	5/20/2022 11:08 PM
Acenaphthylene	ND		21	µg/L	1	5/20/2022 11:08 PM
Acetophenone	ND		4.2	µg/L	1	5/20/2022 11:08 PM
Anthracene	ND		21	µg/L	1	5/20/2022 11:08 PM
Atrazine	ND		4.2	µg/L	1	5/20/2022 11:08 PM
Benzaldehyde	ND		4.2	µg/L	1	5/20/2022 11:08 PM
Benzo(a)anthracene	ND		21	µg/L	1	5/20/2022 11:08 PM
Benzo(a)pyrene	ND		21	µg/L	1	5/20/2022 11:08 PM
Benzo(b)fluoranthene	ND		21	µg/L	1	5/20/2022 11:08 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		21	µg/L	1	5/20/2022 11:08 PM
Benzo(k)fluoranthene	ND		21	µg/L	1	5/20/2022 11:08 PM
Bis(2-chloroethoxy)methane	ND		21	µg/L	1	5/20/2022 11:08 PM
Bis(2-chloroethyl)ether	ND		21	µg/L	1	5/20/2022 11:08 PM
Bis(2-chloroisopropyl)ether	ND		21	µg/L	1	5/20/2022 11:08 PM
Bis(2-ethylhexyl)phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Butyl benzyl phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Caprolactam	ND		42	µg/L	1	5/20/2022 11:08 PM
Carbazole	ND		21	µg/L	1	5/20/2022 11:08 PM
Chrysene	ND		21	µg/L	1	5/20/2022 11:08 PM
Dibenzo(a,h)anthracene	ND		21	µg/L	1	5/20/2022 11:08 PM
Dibenzofuran	ND		21	µg/L	1	5/20/2022 11:08 PM
Diethyl phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Dimethyl phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Di-n-butyl phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Di-n-octyl phthalate	ND		21	µg/L	1	5/20/2022 11:08 PM
Fluoranthene	ND		21	µg/L	1	5/20/2022 11:08 PM
Fluorene	ND		21	µg/L	1	5/20/2022 11:08 PM
Hexachlorobenzene	ND		21	µg/L	1	5/20/2022 11:08 PM
Hexachlorobutadiene	ND		21	µg/L	1	5/20/2022 11:08 PM
Hexachlorocyclopentadiene	ND		21	µg/L	1	5/20/2022 11:08 PM
Hexachloroethane	ND		21	µg/L	1	5/20/2022 11:08 PM
Indeno(1,2,3-cd)pyrene	ND		21	µg/L	1	5/20/2022 11:08 PM
Isophorone	ND		21	µg/L	1	5/20/2022 11:08 PM
Naphthalene	ND		21	µg/L	1	5/20/2022 11:08 PM
Nitrobenzene	ND		21	µg/L	1	5/20/2022 11:08 PM
N-Nitrosodi-n-propylamine	ND		21	µg/L	1	5/20/2022 11:08 PM
N-Nitrosodiphenylamine	ND		21	µg/L	1	5/20/2022 11:08 PM
Pentachlorophenol	ND		21	µg/L	1	5/20/2022 11:08 PM
Phenanthrene	ND		21	µg/L	1	5/20/2022 11:08 PM
Phenol	ND		21	µg/L	1	5/20/2022 11:08 PM
Pyrene	ND		21	µg/L	1	5/20/2022 11:08 PM
Surr: 2,4,6-Tribromophenol	*77.7*		*27-83*	*%REC*	1	5/20/2022 11:08 PM
Surr: 2-Fluorobiphenyl	*71.8*		*26-79*	*%REC*	1	5/20/2022 11:08 PM
Surr: 2-Fluorophenol	*42.7*		*13-56*	*%REC*	1	5/20/2022 11:08 PM
Surr: 4-Terphenyl-d14	*89.0*		*43-106*	*%REC*	1	5/20/2022 11:08 PM
Surr: Nitrobenzene-d5	*67.4*		*29-80*	*%REC*	1	5/20/2022 11:08 PM
Surr: Phenol-d6	*28.7*		*10-35*	*%REC*	1	5/20/2022 11:08 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 03:10 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 03:10 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Acetone	ND		10	µg/L	1	5/20/2022 03:10 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 03:10 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 03:10 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 03:10 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 03:10 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-14-20 **Lab ID:** 22051511-11
Collection Date: 5/16/2022 10:55 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 03:10 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 03:10 AM
Surr: 1,2-Dichloroethane-d4	*101*		*75-120*	*%REC*	1	5/20/2022 03:10 AM
Surr: 4-Bromofluorobenzene	*91.7*		*80-110*	*%REC*	1	5/20/2022 03:10 AM
Surr: Dibromofluoromethane	*105*		*85-115*	*%REC*	1	5/20/2022 03:10 AM
Surr: Toluene-d8	*100*		*85-110*	*%REC*	1	5/20/2022 03:10 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 08:12 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 08:12 AM
Surr: Decachlorobiphenyl	*98.1*		*42-153*	*%REC*	1	5/21/2022 08:12 AM
Surr: Tetrachloro-m-xylene	*91.7*		*48-127*	*%REC*	1	5/21/2022 08:12 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:54 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.019**		**0.010**	**mg/L**	1	5/23/2022 07:35 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Barium	**0.18**		**0.0050**	**mg/L**	1	5/23/2022 07:35 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:35 PM
Boron	**0.094**		**0.020**	**mg/L**	1	5/23/2022 07:35 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:35 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:35 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:35 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorobutanesulfonic Acid (PFBS)	**9.3**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorobutanoic Acid (PFBA)	**40**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.7	ng/L	1	5/25/2022 08:48 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluoroheptanoic Acid (PFHpA)	**12**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorohexanesulfonic Acid (PFHxS)	**32**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorohexanoic Acid (PFHxA)	**13**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorononanoic Acid (PFNA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorooctanesulfonic Acid (PFOS)	**7.1**		**1.9**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorooctanoic Acid (PFOA)	**39**		**1.9**	**ng/L**	1	5/25/2022 08:48 AM
Perfluoropentanesulfonic Acid (PFPeS)	**5.5**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluoropentanoic Acid (PFPeA)	**17**		**4.7**	**ng/L**	1	5/25/2022 08:48 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.7	ng/L	1	5/25/2022 08:48 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.7	ng/L	1	5/25/2022 08:48 AM
11Cl-Pf3OUdS	ND		4.7	ng/L	1	5/25/2022 08:48 AM
9Cl-PF3ONS	ND		4.7	ng/L	1	5/25/2022 08:48 AM
Surr: 13C2-FtS 4:2	*206*	S	*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-FtS 6:2	*134*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-FtS 8:2	*86.0*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-PFDA	*84.3*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-PFDoA	*76.7*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-PFHxA	*114*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-PFTeA	*70.3*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C2-PFUnA	*91.2*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C3-HFPO-DA	*99.6*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C3-PFBS	*103*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C4-PFBA	*128*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C4-PFHpA	*103*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C4-PFOA	*106*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C4-PFOS	*97.2*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C5-PFNA	*126*		*50-150*	*%REC*	1	5/25/2022 08:48 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*113*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 13C8-FOSA	*101*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: 18O2-PFHxS	*130*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: d5-N-EtFOSAA	*87.0*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
Surr: d3-N-MeFOSAA	*61.5*		*50-150*	*%REC*	1	5/25/2022 08:48 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 11:28 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:28 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 11:28 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 11:28 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:28 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:28 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 11:28 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 11:28 PM
Acetophenone	ND		3.8	µg/L	1	5/20/2022 11:28 PM
Anthracene	ND		19	µg/L	1	5/20/2022 11:28 PM
Atrazine	ND		3.8	µg/L	1	5/20/2022 11:28 PM
Benzaldehyde	ND		3.8	µg/L	1	5/20/2022 11:28 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 11:28 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 11:28 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 11:28 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 11:28 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 11:28 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 11:28 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 11:28 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 11:28 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Caprolactam	ND		38	µg/L	1	5/20/2022 11:28 PM
Carbazole	ND		19	µg/L	1	5/20/2022 11:28 PM
Chrysene	ND		19	µg/L	1	5/20/2022 11:28 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 11:28 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 11:28 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 11:28 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 11:28 PM
Fluorene	ND		19	µg/L	1	5/20/2022 11:28 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 11:28 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 11:28 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 11:28 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 11:28 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 11:28 PM
Isophorone	ND		19	µg/L	1	5/20/2022 11:28 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 11:28 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 11:28 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 11:28 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 11:28 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 11:28 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 11:28 PM
Phenol	ND		19	µg/L	1	5/20/2022 11:28 PM
Pyrene	ND		19	µg/L	1	5/20/2022 11:28 PM
Surr: 2,4,6-Tribromophenol	*73.0*		*27-83*	*%REC*	1	5/20/2022 11:28 PM
Surr: 2-Fluorobiphenyl	*73.0*		*26-79*	*%REC*	1	5/20/2022 11:28 PM
Surr: 2-Fluorophenol	*45.2*		*13-56*	*%REC*	1	5/20/2022 11:28 PM
Surr: 4-Terphenyl-d14	*88.1*		*43-106*	*%REC*	1	5/20/2022 11:28 PM
Surr: Nitrobenzene-d5	*69.6*		*29-80*	*%REC*	1	5/20/2022 11:28 PM
Surr: Phenol-d6	*30.2*		*10-35*	*%REC*	1	5/20/2022 11:28 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 03:28 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 03:28 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Acetone	ND		10	µg/L	1	5/20/2022 03:28 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 03:28 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 03:28 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 03:28 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 03:28 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-15-20 **Lab ID:** 22051511-12
Collection Date: 5/16/2022 10:25 AM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 03:28 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 03:28 AM
Surr: 1,2-Dichloroethane-d4	*99.5*		*75-120*	*%REC*	1	5/20/2022 03:28 AM
Surr: 4-Bromofluorobenzene	*94.2*		*80-110*	*%REC*	1	5/20/2022 03:28 AM
Surr: Dibromofluoromethane	*103*		*85-115*	*%REC*	1	5/20/2022 03:28 AM
Surr: Toluene-d8	*101*		*85-110*	*%REC*	1	5/20/2022 03:28 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *01-Jun-2022*

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
Work Order: 22051511
Sample ID: Field Blank
Lab ID: 22051511-13
Collection Date: 5/16/2022 03:45 PM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorobutanesulfonic Acid (PFBS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorobutanoic Acid (PFBA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorodecanoic Acid (PFDA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluoroheptanoic Acid (PFHpA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorohexanesulfonic Acid (PFHxS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorohexanoic Acid (PFHxA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorononanoic Acid (PFNA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		2.0	ng/L	1	5/25/2022 08:56 AM
Perfluorooctanoic Acid (PFOA)	ND		2.0	ng/L	1	5/25/2022 08:56 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 08:56 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.9	ng/L	1	5/25/2022 08:56 AM
11Cl-Pf3OUdS	ND		4.9	ng/L	1	5/25/2022 08:56 AM
9Cl-PF3ONS	ND		4.9	ng/L	1	5/25/2022 08:56 AM
Surr: 13C2-FtS 4:2	*94.9*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-FtS 6:2	*96.8*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-FtS 8:2	*98.2*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-PFDA	*96.7*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-PFDoA	*95.8*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-PFHxA	*108*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-PFTeA	*99.3*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C2-PFUnA	*92.6*		*50-150*	*%REC*	1	5/25/2022 08:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: Field Blank **Lab ID:** 22051511-13
Collection Date: 5/16/2022 03:45 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C3-HFPO-DA	*100*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C3-PFBS	*102*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C4-PFBA	*108*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C4-PFHpA	*89.5*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C4-PFOA	*93.7*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C4-PFOS	*103*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C5-PFNA	*89.0*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C5-PFPeA	*95.1*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 13C8-FOSA	*73.9*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: 18O2-PFHxS	*84.1*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: d5-N-EtFOSAA	*70.2*		*50-150*	*%REC*	1	5/25/2022 08:56 AM
Surr: d3-N-MeFOSAA	*74.4*		*50-150*	*%REC*	1	5/25/2022 08:56 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *01-Jun-2022*

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill
Work Order: 22051511
Sample ID: DUP
Lab ID: 22051511-14
Collection Date: 5/16/2022
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 08:25 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 08:25 AM
Surr: Decachlorobiphenyl	*97.0*		*42-153*	*%REC*	1	5/21/2022 08:25 AM
Surr: Tetrachloro-m-xylene	*92.2*		*48-127*	*%REC*	1	5/21/2022 08:25 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 12:56 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/23/22 17:14	Analyst: **STP**
Aluminum	**0.034**		**0.010**	**mg/L**	1	5/23/2022 07:40 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Arsenic	**0.0098**		**0.0050**	**mg/L**	1	5/23/2022 07:40 PM
Barium	**0.29**		**0.0050**	**mg/L**	1	5/23/2022 07:40 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:40 PM
Boron	**0.11**		**0.020**	**mg/L**	1	5/23/2022 07:40 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:40 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:40 PM
Zinc	ND		0.010	mg/L	1	5/25/2022 05:05 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorobutanesulfonic Acid (PFBS)	**5.8**		**4.7**	**ng/L**	1	5/25/2022 09:05 AM
Perfluorobutanoic Acid (PFBA)	**8.1**		**4.7**	**ng/L**	1	5/25/2022 09:05 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.7	ng/L	1	5/25/2022 09:05 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: DUP **Lab ID:** 22051511-14
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluoroheptanoic Acid (PFHpA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorohexanesulfonic Acid (PFHxS)	**15**		**4.7**	**ng/L**	1	5/25/2022 09:05 AM
Perfluorohexanoic Acid (PFHxA)	**5.4**		**4.7**	**ng/L**	1	5/25/2022 09:05 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorononanoic Acid (PFNA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorooctanesulfonic Acid (PFOS)	ND		1.9	ng/L	1	5/25/2022 09:05 AM
Perfluorooctanoic Acid (PFOA)	**18**		**1.9**	**ng/L**	1	5/25/2022 09:05 AM
Perfluoropentanesulfonic Acid (PFPeS)	**5.7**		**4.7**	**ng/L**	1	5/25/2022 09:05 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.7	ng/L	1	5/25/2022 09:05 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.7	ng/L	1	5/25/2022 09:05 AM
11Cl-Pf3OUdS	ND		4.7	ng/L	1	5/25/2022 09:05 AM
9Cl-PF3ONS	ND		4.7	ng/L	1	5/25/2022 09:05 AM
Surr: 13C2-FtS 4:2	*80.4*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-FtS 6:2	*73.5*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-FtS 8:2	*91.3*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-PFDA	*68.5*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-PFDoA	*55.2*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-PFHxA	*71.6*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-PFTeA	*74.7*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C2-PFUnA	*62.8*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C3-HFPO-DA	*73.6*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C3-PFBS	*90.7*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C4-PFBA	*82.9*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C4-PFHpA	*89.3*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C4-PFOA	*81.2*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C4-PFOS	*67.0*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C5-PFNA	*65.7*		*50-150*	*%REC*	1	5/25/2022 09:05 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: DUP **Lab ID:** 22051511-14
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*85.1*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 13C8-FOSA	*56.5*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: 18O2-PFHxS	*68.1*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: d5-N-EtFOSAA	*53.6*		*50-150*	*%REC*	1	5/25/2022 09:05 AM
Surr: d3-N-MeFOSAA	*47.0*	S	*50-150*	*%REC*	1	5/25/2022 09:05 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4,5-Trichlorophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4,6-Trichlorophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4-Dichlorophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4-Dimethylphenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4-Dinitrophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2,4-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 11:49 PM
2,6-Dinitrotoluene	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Chloronaphthalene	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Chlorophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Methylnaphthalene	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Methylphenol	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:49 PM
2-Nitrophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
3&4-Methylphenol	ND		19	µg/L	1	5/20/2022 11:49 PM
3,3´-Dichlorobenzidine	ND		19	µg/L	1	5/20/2022 11:49 PM
3-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:49 PM
4,6-Dinitro-2-methylphenol	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Bromophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Chloro-3-methylphenol	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Chloroaniline	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Chlorophenyl phenyl ether	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Nitroaniline	ND		19	µg/L	1	5/20/2022 11:49 PM
4-Nitrophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
Acenaphthene	ND		19	µg/L	1	5/20/2022 11:49 PM
Acenaphthylene	ND		19	µg/L	1	5/20/2022 11:49 PM
Acetophenone	ND		3.8	µg/L	1	5/20/2022 11:49 PM
Anthracene	ND		19	µg/L	1	5/20/2022 11:49 PM
Atrazine	ND		3.8	µg/L	1	5/20/2022 11:49 PM
Benzaldehyde	ND		3.8	µg/L	1	5/20/2022 11:49 PM
Benzo(a)anthracene	ND		19	µg/L	1	5/20/2022 11:49 PM
Benzo(a)pyrene	ND		19	µg/L	1	5/20/2022 11:49 PM
Benzo(b)fluoranthene	ND		19	µg/L	1	5/20/2022 11:49 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: DUP **Lab ID:** 22051511-14
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		19	µg/L	1	5/20/2022 11:49 PM
Benzo(k)fluoranthene	ND		19	µg/L	1	5/20/2022 11:49 PM
Bis(2-chloroethoxy)methane	ND		19	µg/L	1	5/20/2022 11:49 PM
Bis(2-chloroethyl)ether	ND		19	µg/L	1	5/20/2022 11:49 PM
Bis(2-chloroisopropyl)ether	ND		19	µg/L	1	5/20/2022 11:49 PM
Bis(2-ethylhexyl)phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Butyl benzyl phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Caprolactam	ND		38	µg/L	1	5/20/2022 11:49 PM
Carbazole	ND		19	µg/L	1	5/20/2022 11:49 PM
Chrysene	ND		19	µg/L	1	5/20/2022 11:49 PM
Dibenzo(a,h)anthracene	ND		19	µg/L	1	5/20/2022 11:49 PM
Dibenzofuran	ND		19	µg/L	1	5/20/2022 11:49 PM
Diethyl phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Dimethyl phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Di-n-butyl phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Di-n-octyl phthalate	ND		19	µg/L	1	5/20/2022 11:49 PM
Fluoranthene	ND		19	µg/L	1	5/20/2022 11:49 PM
Fluorene	ND		19	µg/L	1	5/20/2022 11:49 PM
Hexachlorobenzene	ND		19	µg/L	1	5/20/2022 11:49 PM
Hexachlorobutadiene	ND		19	µg/L	1	5/20/2022 11:49 PM
Hexachlorocyclopentadiene	ND		19	µg/L	1	5/20/2022 11:49 PM
Hexachloroethane	ND		19	µg/L	1	5/20/2022 11:49 PM
Indeno(1,2,3-cd)pyrene	ND		19	µg/L	1	5/20/2022 11:49 PM
Isophorone	ND		19	µg/L	1	5/20/2022 11:49 PM
Naphthalene	ND		19	µg/L	1	5/20/2022 11:49 PM
Nitrobenzene	ND		19	µg/L	1	5/20/2022 11:49 PM
N-Nitrosodi-n-propylamine	ND		19	µg/L	1	5/20/2022 11:49 PM
N-Nitrosodiphenylamine	ND		19	µg/L	1	5/20/2022 11:49 PM
Pentachlorophenol	ND		19	µg/L	1	5/20/2022 11:49 PM
Phenanthrene	ND		19	µg/L	1	5/20/2022 11:49 PM
Phenol	ND		19	µg/L	1	5/20/2022 11:49 PM
Pyrene	ND		19	µg/L	1	5/20/2022 11:49 PM
Surr: 2,4,6-Tribromophenol	*76.7*		*27-83*	*%REC*	1	5/20/2022 11:49 PM
Surr: 2-Fluorobiphenyl	*77.3*		*26-79*	*%REC*	1	5/20/2022 11:49 PM
Surr: 2-Fluorophenol	*47.1*		*13-56*	*%REC*	1	5/20/2022 11:49 PM
Surr: 4-Terphenyl-d14	*86.9*		*43-106*	*%REC*	1	5/20/2022 11:49 PM
Surr: Nitrobenzene-d5	*74.9*		*29-80*	*%REC*	1	5/20/2022 11:49 PM
Surr: Phenol-d6	*32.2*		*10-35*	*%REC*	1	5/20/2022 11:49 PM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: DUP **Lab ID:** 22051511-14
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 03:47 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 03:47 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Acetone	ND		10	µg/L	1	5/20/2022 03:47 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 03:47 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 03:47 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 03:47 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 03:47 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: DUP **Lab ID:** 22051511-14
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 03:47 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 03:47 AM
Surr: 1,2-Dichloroethane-d4	*98.8*		*75-120*	*%REC*	1	5/20/2022 03:47 AM
Surr: 4-Bromofluorobenzene	*90.6*		*80-110*	*%REC*	1	5/20/2022 03:47 AM
Surr: Dibromofluoromethane	*101*		*85-115*	*%REC*	1	5/20/2022 03:47 AM
Surr: Toluene-d8	*101*		*85-110*	*%REC*	1	5/20/2022 03:47 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: Trip Blank **Lab ID:** 22051511-15
Collection Date: 5/16/2022 **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
VOLATILE ORGANIC COMPOUNDS			**SW8260C**			Analyst: **MF**
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
2-Butanone	ND		5.0	µg/L	1	5/19/2022 11:47 PM
2-Hexanone	ND		5.0	µg/L	1	5/19/2022 11:47 PM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Acetone	ND		10	µg/L	1	5/19/2022 11:47 PM
Benzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Bromodichloromethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Bromoform	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Bromomethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Carbon disulfide	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Carbon tetrachloride	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Chlorobenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Chloroethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Chloroform	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Chloromethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Cyclohexane	ND		2.0	µg/L	1	5/19/2022 11:47 PM
Dibromochloromethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Ethylbenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Isopropylbenzene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Methyl acetate	ND		2.0	µg/L	1	5/19/2022 11:47 PM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Methylcyclohexane	ND		1.0	µg/L	1	5/19/2022 11:47 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: Trip Blank **Lab ID:** 22051511-15
Collection Date: 5/16/2022 **Matrix:** WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Methylene chloride	ND		5.0	µg/L	1	5/19/2022 11:47 PM
Styrene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Tetrachloroethene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Toluene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Trichloroethene	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Vinyl chloride	ND		1.0	µg/L	1	5/19/2022 11:47 PM
Xylenes, Total	ND		3.0	µg/L	1	5/19/2022 11:47 PM
Surr: 1,2-Dichloroethane-d4	*98.1*		*75-120*	*%REC*	1	5/19/2022 11:47 PM
Surr: 4-Bromofluorobenzene	*89.2*		*80-110*	*%REC*	1	5/19/2022 11:47 PM
Surr: Dibromofluoromethane	*101*		*85-115*	*%REC*	1	5/19/2022 11:47 PM
Surr: Toluene-d8	*99.4*		*85-110*	*%REC*	1	5/19/2022 11:47 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
PCBS			**SW8082A**		Prep: SW3511 5/20/22 16:59	Analyst: **RM**
Aroclor 1016	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1221	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1232	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1242	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1248	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1254	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1260	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1262	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Aroclor 1268	ND		0.20	µg/L	1	5/21/2022 03:31 AM
PCBs, Total	ND		0.20	µg/L	1	5/21/2022 03:31 AM
Surr: Decachlorobiphenyl	*71.1*		*42-153*	*%REC*	1	5/21/2022 03:31 AM
Surr: Tetrachloro-m-xylene	*86.7*		*48-127*	*%REC*	1	5/21/2022 03:31 AM
MERCURY BY CVAA (DISSOLVED)			**SW7470A**		Prep: SW7470 5/19/22 11:03	Analyst: **EJC**
Mercury	ND		0.00020	mg/L	1	5/19/2022 01:01 PM
METALS BY ICP-MS (DISSOLVED)			**SW6020B**		Prep: SW3015A 5/29/22 18:37	Analyst: **STP**
Aluminum	**0.058**		**0.010**	**mg/L**	1	5/31/2022 03:50 PM
Antimony	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Arsenic	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Barium	**0.19**		**0.0050**	**mg/L**	1	5/23/2022 07:47 PM
Beryllium	ND		0.0020	mg/L	1	5/23/2022 07:47 PM
Boron	**0.13**		**0.020**	**mg/L**	1	5/23/2022 07:47 PM
Cadmium	ND		0.0020	mg/L	1	5/23/2022 07:47 PM
Chromium	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Copper	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Lead	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Nickel	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Selenium	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Silver	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Thallium	ND		0.0050	mg/L	1	5/23/2022 07:47 PM
Zinc	ND		0.010	mg/L	1	5/23/2022 07:47 PM
PFAS BY EPA 537 MODIFIED			**E537 MOD**		Prep: E537 Mod 5/23/22 17:15	Analyst: **ENS**
Fluorotelomer Sulphonic Acid 4:2 (FtS 4:2)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Fluorotelomer Sulphonic Acid 6:2 (FtS 6:2)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Fluorotelomer Sulphonic Acid 8:2 (FtS 8:2)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorobutanesulfonic Acid (PFBS)	**5.8**		**4.9**	**ng/L**	1	5/25/2022 09:13 AM
Perfluorobutanoic Acid (PFBA)	**30**		**4.9**	**ng/L**	1	5/25/2022 09:13 AM
Perfluorodecanesulfonic Acid (PFDS)	ND		4.9	ng/L	1	5/25/2022 09:13 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Perfluorodecanoic Acid (PFDA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorododecanoic Acid (PFDoA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluoroheptanesulfonic Acid (PFHpS)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluoroheptanoic Acid (PFHpA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorohexanesulfonic Acid (PFHxS)	**6.4**		**4.9**	**ng/L**	1	5/25/2022 09:13 AM
Perfluorohexanoic Acid (PFHxA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorononanesulfonic Acid (PFNS)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorononanoic Acid (PFNA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorooctanesulfonamide (PFOSA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorooctanesulfonic Acid (PFOS)	**5.8**		**2.0**	**ng/L**	1	5/25/2022 09:13 AM
Perfluorooctanoic Acid (PFOA)	**13**		**2.0**	**ng/L**	1	5/25/2022 09:13 AM
Perfluoropentanesulfonic Acid (PFPeS)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluoropentanoic Acid (PFPeA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorotetradecanoic Acid (PFTeA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluorotridecanoic Acid (PFTriA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Perfluoroundecanoic Acid (PFUnA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
N-Ethylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 09:13 AM
N-Methylperfluorooctanesulfonamidoacetic Acid	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
4,8-Dioxa-3H-perfluorononanoic Acid (DONA)	ND		4.9	ng/L	1	5/25/2022 09:13 AM
11Cl-Pf3OUdS	ND		4.9	ng/L	1	5/25/2022 09:13 AM
9Cl-PF3ONS	ND		4.9	ng/L	1	5/25/2022 09:13 AM
Surr: 13C2-FtS 4:2	*107*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-FtS 6:2	*92.7*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-FtS 8:2	*86.7*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-PFDA	*71.5*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-PFDoA	*54.9*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-PFHxA	*83.5*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-PFTeA	*67.3*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C2-PFUnA	*85.7*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C3-HFPO-DA	*72.0*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C3-PFBS	*102*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C4-PFBA	*112*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C4-PFHpA	*114*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C4-PFOA	*104*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C4-PFOS	*79.1*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C5-PFNA	*101*		*50-150*	*%REC*	1	5/25/2022 09:13 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Surr: 13C5-PFPeA	*101*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 13C8-FOSA	*62.5*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: 18O2-PFHxS	*105*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: d5-N-EtFOSAA	*72.4*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
Surr: d3-N-MeFOSAA	*51.1*		*50-150*	*%REC*	1	5/25/2022 09:13 AM
SEMI-VOLATILE ORGANIC COMPOUNDS			**SW846 8270D**		Prep: SW3510 5/20/22 14:40	Analyst: **EE**
1,1`-Biphenyl	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4,5-Trichlorophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4,6-Trichlorophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4-Dichlorophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4-Dimethylphenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4-Dinitrophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2,4-Dinitrotoluene	ND		18	µg/L	1	5/21/2022 12:09 AM
2,6-Dinitrotoluene	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Chloronaphthalene	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Chlorophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Methylnaphthalene	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Methylphenol	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Nitroaniline	ND		18	µg/L	1	5/21/2022 12:09 AM
2-Nitrophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
3&4-Methylphenol	ND		18	µg/L	1	5/21/2022 12:09 AM
3,3´-Dichlorobenzidine	ND		18	µg/L	1	5/21/2022 12:09 AM
3-Nitroaniline	ND		18	µg/L	1	5/21/2022 12:09 AM
4,6-Dinitro-2-methylphenol	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Bromophenyl phenyl ether	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Chloro-3-methylphenol	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Chloroaniline	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Chlorophenyl phenyl ether	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Nitroaniline	ND		18	µg/L	1	5/21/2022 12:09 AM
4-Nitrophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
Acenaphthene	ND		18	µg/L	1	5/21/2022 12:09 AM
Acenaphthylene	ND		18	µg/L	1	5/21/2022 12:09 AM
Acetophenone	ND		3.6	µg/L	1	5/21/2022 12:09 AM
Anthracene	ND		18	µg/L	1	5/21/2022 12:09 AM
Atrazine	ND		3.6	µg/L	1	5/21/2022 12:09 AM
Benzaldehyde	ND		3.6	µg/L	1	5/21/2022 12:09 AM
Benzo(a)anthracene	ND		18	µg/L	1	5/21/2022 12:09 AM
Benzo(a)pyrene	ND		18	µg/L	1	5/21/2022 12:09 AM
Benzo(b)fluoranthene	ND		18	µg/L	1	5/21/2022 12:09 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Benzo(g,h,i)perylene	ND		18	µg/L	1	5/21/2022 12:09 AM
Benzo(k)fluoranthene	ND		18	µg/L	1	5/21/2022 12:09 AM
Bis(2-chloroethoxy)methane	ND		18	µg/L	1	5/21/2022 12:09 AM
Bis(2-chloroethyl)ether	ND		18	µg/L	1	5/21/2022 12:09 AM
Bis(2-chloroisopropyl)ether	ND		18	µg/L	1	5/21/2022 12:09 AM
Bis(2-ethylhexyl)phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Butyl benzyl phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Caprolactam	ND		36	µg/L	1	5/21/2022 12:09 AM
Carbazole	ND		18	µg/L	1	5/21/2022 12:09 AM
Chrysene	ND		18	µg/L	1	5/21/2022 12:09 AM
Dibenzo(a,h)anthracene	ND		18	µg/L	1	5/21/2022 12:09 AM
Dibenzofuran	ND		18	µg/L	1	5/21/2022 12:09 AM
Diethyl phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Dimethyl phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Di-n-butyl phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Di-n-octyl phthalate	ND		18	µg/L	1	5/21/2022 12:09 AM
Fluoranthene	ND		18	µg/L	1	5/21/2022 12:09 AM
Fluorene	ND		18	µg/L	1	5/21/2022 12:09 AM
Hexachlorobenzene	ND		18	µg/L	1	5/21/2022 12:09 AM
Hexachlorobutadiene	ND		18	µg/L	1	5/21/2022 12:09 AM
Hexachlorocyclopentadiene	ND		18	µg/L	1	5/21/2022 12:09 AM
Hexachloroethane	ND		18	µg/L	1	5/21/2022 12:09 AM
Indeno(1,2,3-cd)pyrene	ND		18	µg/L	1	5/21/2022 12:09 AM
Isophorone	ND		18	µg/L	1	5/21/2022 12:09 AM
Naphthalene	ND		18	µg/L	1	5/21/2022 12:09 AM
Nitrobenzene	ND		18	µg/L	1	5/21/2022 12:09 AM
N-Nitrosodi-n-propylamine	ND		18	µg/L	1	5/21/2022 12:09 AM
N-Nitrosodiphenylamine	ND		18	µg/L	1	5/21/2022 12:09 AM
Pentachlorophenol	ND		18	µg/L	1	5/21/2022 12:09 AM
Phenanthrene	ND		18	µg/L	1	5/21/2022 12:09 AM
Phenol	ND		18	µg/L	1	5/21/2022 12:09 AM
Pyrene	ND		18	µg/L	1	5/21/2022 12:09 AM
Surr: 2,4,6-Tribromophenol	*70.1*		*27-83*	*%REC*	1	5/21/2022 12:09 AM
Surr: 2-Fluorobiphenyl	*75.0*		*26-79*	*%REC*	1	5/21/2022 12:09 AM
Surr: 2-Fluorophenol	*41.8*		*13-56*	*%REC*	1	5/21/2022 12:09 AM
Surr: 4-Terphenyl-d14	*85.8*		*43-106*	*%REC*	1	5/21/2022 12:09 AM
Surr: Nitrobenzene-d5	*71.5*		*29-80*	*%REC*	1	5/21/2022 12:09 AM
Surr: Phenol-d6	*28.0*		*10-35*	*%REC*	1	5/21/2022 12:09 AM

VOLATILE ORGANIC COMPOUNDS **SW8260C** Analyst: **MF**

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
1,1,1-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,1,2,2-Tetrachloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,1,2-Trichloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,1,2-Trichlorotrifluoroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,1-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,1-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2,4-Trichlorobenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2-Dibromo-3-chloropropane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2-Dibromoethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2-Dichloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,2-Dichloropropane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,3-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
1,4-Dichlorobenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
2-Butanone	ND		5.0	µg/L	1	5/20/2022 04:05 AM
2-Hexanone	ND		5.0	µg/L	1	5/20/2022 04:05 AM
4-Methyl-2-pentanone	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Acetone	ND		10	µg/L	1	5/20/2022 04:05 AM
Benzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Bromodichloromethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Bromoform	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Bromomethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Carbon disulfide	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Carbon tetrachloride	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Chlorobenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Chloroethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Chloroform	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Chloromethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
cis-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
cis-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Cyclohexane	ND		2.0	µg/L	1	5/20/2022 04:05 AM
Dibromochloromethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Dichlorodifluoromethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Ethylbenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Isopropylbenzene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Methyl acetate	ND		2.0	µg/L	1	5/20/2022 04:05 AM
Methyl tert-butyl ether	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Methylcyclohexane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Methylene chloride	ND		5.0	µg/L	1	5/20/2022 04:05 AM
Styrene	ND		1.0	µg/L	1	5/20/2022 04:05 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill **Work Order:** 22051511
Sample ID: MW-109 **Lab ID:** 22051511-16
Collection Date: 5/16/2022 **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Tetrachloroethene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Toluene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
trans-1,2-Dichloroethene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
trans-1,3-Dichloropropene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Trichloroethene	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Trichlorofluoromethane	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Vinyl chloride	ND		1.0	µg/L	1	5/20/2022 04:05 AM
Xylenes, Total	ND		3.0	µg/L	1	5/20/2022 04:05 AM
Surr: 1,2-Dichloroethane-d4	*98.2*		*75-120*	*%REC*	1	5/20/2022 04:05 AM
Surr: 4-Bromofluorobenzene	*83.2*		*80-110*	*%REC*	1	5/20/2022 04:05 AM
Surr: Dibromofluoromethane	*102*		*85-115*	*%REC*	1	5/20/2022 04:05 AM
Surr: Toluene-d8	*95.4*		*85-110*	*%REC*	1	5/20/2022 04:05 AM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 01-Jun-22

Client: The Mannik & Smith Group, Inc.

Work Order: 22051511

Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196634** Instrument ID **GC14** Method: **SW8082A**

MBLK Sample ID: **PBLKW1-196634-196634** Units: **µg/L** Analysis Date: **5/21/2022 02:40 AM**

Client ID: Run ID: **GC14_220520A** SeqNo: **8445303** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	ND	0.20								
Aroclor 1221	ND	0.20								
Aroclor 1232	ND	0.20								
Aroclor 1242	ND	0.20								
Aroclor 1248	ND	0.20								
Aroclor 1254	ND	0.20								
Aroclor 1260	ND	0.20								
Aroclor 1262	ND	0.20								
Aroclor 1268	ND	0.20								
PCBs, Total	ND	0.20								
Surr: Decachlorobiphenyl	*0.2057*	0	*0.208*	0	*98.9*	*42-153*	0			
Surr: Tetrachloro-m-xylene	*0.168*	0	*0.208*	0	*80.8*	*48-127*	0			

LCS Sample ID: **PLCSW1-196634-196634** Units: **µg/L** Analysis Date: **5/21/2022 03:05 AM**

Client ID: Run ID: **GC14_220520A** SeqNo: **8445305** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	4.099	0.20	4.17	0	98.3	71-130	0			
Aroclor 1260	2.956	0.20	4.17	0	70.9	54-135	0			
Surr: Decachlorobiphenyl	*0.1543*	0	*0.208*	0	*74.2*	*42-153*	0			
Surr: Tetrachloro-m-xylene	*0.1947*	0	*0.208*	0	*93.6*	*48-127*	0			

LCSD Sample ID: **PLCSDW1-196634-196634** Units: **µg/L** Analysis Date: **5/21/2022 03:18 AM**

Client ID: Run ID: **GC14_220520A** SeqNo: **8445306** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aroclor 1016	4.11	0.20	4.17	0	98.6	71-130	4.099	0.282	20	
Aroclor 1260	3.132	0.20	4.17	0	75.1	54-135	2.956	5.79	20	
Surr: Decachlorobiphenyl	*0.1875*	0	*0.208*	0	*90.1*	*42-153*	0.1543	*19.4*	*20*	
Surr: Tetrachloro-m-xylene	*0.1895*	0	*0.208*	0	*91.1*	*48-127*	0.1947	*2.69*	*20*	

The following samples were analyzed in this batch:

22051511-01B	22051511-02B	22051511-03B
22051511-04B	22051511-05B	22051511-06B
22051511-07B	22051511-08B	22051511-09B
22051511-10B	22051511-11B	22051511-12B
22051511-14B	22051511-16B	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196557** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-196557-196557** Units: **mg/L** Analysis Date: **5/19/2022 12:11 PM**
Client ID: Run ID: **HG4_220519A** SeqNo: **8435553** Prep Date: **5/19/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-196557-196557** Units: **mg/L** Analysis Date: **5/19/2022 12:13 PM**
Client ID: Run ID: **HG4_220519A** SeqNo: **8435554** Prep Date: **5/19/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002295	0.00020	0.002	0	115	80-120	0			

MS Sample ID: **22051511-14DMS** Units: **mg/L** Analysis Date: **5/19/2022 12:58 PM**
Client ID: **DUP** Run ID: **HG4_220519A** SeqNo: **8435579** Prep Date: **5/19/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00020	0.002	0.0000465	107	75-125	0			

MSD Sample ID: **22051511-14DMSD** Units: **mg/L** Analysis Date: **5/19/2022 12:59 PM**
Client ID: **DUP** Run ID: **HG4_220519A** SeqNo: **8435580** Prep Date: **5/19/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00222	0.00020	0.002	0.0000465	109	75-125	0.00219	1.36	20	

The following samples were analyzed in this batch:

22051511-01D	22051511-02D	22051511-03D
22051511-04D	22051511-05D	22051511-06D
22051511-07D	22051511-08D	22051511-09D
22051511-10D	22051511-11D	22051511-12D
22051511-14D	22051511-16D	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196747** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK Sample ID: **MBLK-196747-196747** Units: **mg/L** Analysis Date: **5/23/2022 06:54 PM**

Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447286** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	ND	0.010								
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Chromium	ND	0.0050								
Copper	0.002204	0.0050								J
Lead	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	0.02586	0.010								

LCS Sample ID: **LCS-196747-196747** Units: **mg/L** Analysis Date: **5/23/2022 06:55 PM**

Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447288** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1013	0.010	0.1	0	101	80-120	0			
Antimony	0.09687	0.0050	0.1	0	96.9	80-120	0			
Arsenic	0.09878	0.0050	0.1	0	98.8	80-120	0			
Barium	0.1001	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09945	0.0020	0.1	0	99.4	80-120	0			
Boron	0.5116	0.020	0.5	0	102	80-120	0			
Cadmium	0.09773	0.0020	0.1	0	97.7	80-120	0			
Chromium	0.1026	0.0050	0.1	0	103	80-120	0			
Copper	0.1057	0.0050	0.1	0	106	80-120	0			
Lead	0.09594	0.0050	0.1	0	95.9	80-120	0			
Nickel	0.1042	0.0050	0.1	0	104	80-120	0			
Selenium	0.09634	0.0050	0.1	0	96.3	80-120	0			
Silver	0.08183	0.0050	0.1	0	81.8	80-120	0			
Thallium	0.097	0.0050	0.1	0	97	80-120	0			
Zinc	0.1176	0.010	0.1	0	118	80-120	0			B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196747** Instrument ID **ICPMS3** Method: **SW6020B**

MS Sample ID: **22051511-01DMS** Units: **mg/L** Analysis Date: **5/23/2022 07:12 PM**
Client ID: **MW-101** Run ID: **ICPMS3_220523A** SeqNo: **8447299** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1496	0.010	0.1	0.01547	134	75-125	0			S
Antimony	0.09946	0.0050	0.1	0.0001936	99.3	75-125	0			
Arsenic	0.1054	0.0050	0.1	0.004369	101	75-125	0			
Barium	0.1957	0.0050	0.1	0.09689	98.9	75-125	0			
Beryllium	0.1026	0.0020	0.1	0.0000077	103	75-125	0			
Boron	0.8189	0.020	0.5	0.2965	104	75-125	0			
Cadmium	0.09819	0.0020	0.1	0	98.2	75-125	0			
Chromium	0.1045	0.0050	0.1	0.0008184	104	75-125	0			
Copper	0.1013	0.0050	0.1	0.0004356	101	75-125	0			
Lead	0.09861	0.0050	0.1	-0.001705	100	75-125	0			
Nickel	0.1016	0.0050	0.1	0.002687	98.9	75-125	0			
Selenium	0.09838	0.0050	0.1	0.0003124	98.1	75-125	0			
Silver	0.07876	0.0050	0.1	0.0000044	78.8	75-125	0			
Thallium	0.0994	0.0050	0.1	-0.0000099	99.4	75-125	0			
Zinc	0.3072	0.010	0.1	0.00695	300	75-125	0			BS

MSD Sample ID: **22051511-01DMSD** Units: **mg/L** Analysis Date: **5/23/2022 07:13 PM**
Client ID: **MW-101** Run ID: **ICPMS3_220523A** SeqNo: **8447300** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1147	0.010	0.1	0.01547	99.2	75-125	0.1496	26.4	20	R
Antimony	0.0971	0.0050	0.1	0.0001936	96.9	75-125	0.09946	2.39	20	
Arsenic	0.1036	0.0050	0.1	0.004369	99.2	75-125	0.1054	1.77	20	
Barium	0.1949	0.0050	0.1	0.09689	98	75-125	0.1957	0.451	20	
Beryllium	0.1	0.0020	0.1	0.0000077	100	75-125	0.1026	2.51	20	
Boron	0.8104	0.020	0.5	0.2965	103	75-125	0.8189	1.05	20	
Cadmium	0.09753	0.0020	0.1	0	97.5	75-125	0.09819	0.67	20	
Chromium	0.1014	0.0050	0.1	0.0008184	101	75-125	0.1045	3.01	20	
Copper	0.1001	0.0050	0.1	0.0004356	99.6	75-125	0.1013	1.21	20	
Lead	0.09688	0.0050	0.1	-0.001705	98.6	75-125	0.09861	1.77	20	
Nickel	0.1003	0.0050	0.1	0.002687	97.6	75-125	0.1016	1.28	20	
Selenium	0.09595	0.0050	0.1	0.0003124	95.6	75-125	0.09838	2.5	20	
Silver	0.07698	0.0050	0.1	0.0000044	77	75-125	0.07876	2.29	20	
Thallium	0.09849	0.0050	0.1	-0.0000099	98.5	75-125	0.0994	0.926	20	
Zinc	0.1114	0.010	0.1	0.00695	104	75-125	0.3072	93.5	20	BR

The following samples were analyzed in this batch:

22051511-01D	22051511-02D	22051511-03D
22051511-04D	22051511-05D	22051511-06D
22051511-07D	22051511-08D	22051511-09D
22051511-10D	22051511-11D	22051511-12D
22051511-14D		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196748** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK Sample ID: **MBLK-196748-196748** Units: **mg/L** Analysis Date: **5/23/2022 07:44 PM**
Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447320** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	0.002898	0.0050								J
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Chromium	ND	0.0050								
Copper	ND	0.0050								
Lead	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	0.01099	0.010								

LCS Sample ID: **LCS-196748-196748** Units: **mg/L** Analysis Date: **5/23/2022 07:45 PM**
Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447321** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09741	0.0050	0.1	0	97.4	80-120	0			
Arsenic	0.09556	0.0050	0.1	0	95.6	80-120	0			
Barium	0.103	0.0050	0.1	0	103	80-120	0			
Beryllium	0.0854	0.0020	0.1	0	85.4	80-120	0			
Boron	0.4301	0.020	0.5	0	86	80-120	0			
Cadmium	0.09751	0.0020	0.1	0	97.5	80-120	0			
Chromium	0.09906	0.0050	0.1	0	99.1	80-120	0			
Copper	0.09985	0.0050	0.1	0	99.8	80-120	0			
Lead	0.09759	0.0050	0.1	0	97.6	80-120	0			
Nickel	0.09808	0.0050	0.1	0	98.1	80-120	0			
Selenium	0.09474	0.0050	0.1	0	94.7	80-120	0			
Thallium	0.09862	0.0050	0.1	0	98.6	80-120	0			

LCS Sample ID: **LCS-196748-196748** Units: **mg/L** Analysis Date: **5/24/2022 01:30 PM**
Client ID: Run ID: **ICPMS3_220524A** SeqNo: **8450391** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Silver	0.08265	0.0050	0.1	0	82.7	80-120	0			
Zinc	0.1515	0.010	0.1	0	152	80-120	0			BS

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196748** Instrument ID **ICPMS3** Method: **SW6020B**

MS Sample ID: **22051619-01DMS** Units: **mg/L** Analysis Date: **5/23/2022 08:08 PM**
Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447337** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09952	0.0050	0.1	0.0001243	99.4	75-125	0			
Arsenic	0.09918	0.0050	0.1	0.00022	99	75-125	0			
Barium	0.1071	0.0050	0.1	0.006629	100	75-125	0			
Beryllium	0.1028	0.0020	0.1	0.0000385	103	75-125	0			
Boron	0.5347	0.020	0.5	0.01715	104	75-125	0			
Cadmium	0.09892	0.0020	0.1	0.0000627	98.9	75-125	0			
Chromium	0.1012	0.0050	0.1	0.0006479	101	75-125	0			
Copper	0.105	0.0050	0.1	0.003431	102	75-125	0			
Lead	0.09815	0.0050	0.1	-0.001822	100	75-125	0			
Nickel	0.1013	0.0050	0.1	0.0006347	101	75-125	0			
Selenium	0.09717	0.0050	0.1	0.0002321	96.9	75-125	0			
Silver	0.08028	0.0050	0.1	0	80.3	75-125	0			
Thallium	0.09935	0.0050	0.1	-0.000011	99.4	75-125	0			
Zinc	0.1036	0.010	0.1	0.001426	102	75-125	0			B

MSD Sample ID: **22051619-01DMSD** Units: **mg/L** Analysis Date: **5/23/2022 08:10 PM**
Client ID: Run ID: **ICPMS3_220523A** SeqNo: **8447338** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.1009	0.0050	0.1	0.0001243	101	75-125	0.09952	1.39	20	
Arsenic	0.1016	0.0050	0.1	0.00022	101	75-125	0.09918	2.45	20	
Barium	0.1094	0.0050	0.1	0.006629	103	75-125	0.1071	2.11	20	
Beryllium	0.1032	0.0020	0.1	0.0000385	103	75-125	0.1028	0.36	20	
Boron	0.5448	0.020	0.5	0.01715	106	75-125	0.5347	1.87	20	
Cadmium	0.09995	0.0020	0.1	0.0000627	99.9	75-125	0.09892	1.04	20	
Chromium	0.1036	0.0050	0.1	0.0006479	103	75-125	0.1012	2.28	20	
Copper	0.1073	0.0050	0.1	0.003431	104	75-125	0.105	2.09	20	
Lead	0.09979	0.0050	0.1	-0.001822	102	75-125	0.09815	1.66	20	
Nickel	0.1042	0.0050	0.1	0.0006347	104	75-125	0.1013	2.78	20	
Selenium	0.09535	0.0050	0.1	0.0002321	95.1	75-125	0.09717	1.89	20	
Silver	0.08128	0.0050	0.1	0	81.3	75-125	0.08028	1.24	20	
Thallium	0.1005	0.0050	0.1	-0.000011	100	75-125	0.09935	1.11	20	
Zinc	0.1055	0.010	0.1	0.001426	104	75-125	0.1036	1.75	20	B

The following samples were analyzed in this batch: 22051511-16D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196876** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK Sample ID: **MBLK-196876-196876** Units: **mg/L** Analysis Date: **5/25/2022 03:22 PM**
Client ID: Run ID: **ICPMS3_220525A** SeqNo: **8455596** Prep Date: **5/25/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	ND	0.010								
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Chromium	ND	0.0050								
Copper	ND	0.0050								
Lead	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	ND	0.010								

LCS Sample ID: **LCS-196876-196876** Units: **mg/L** Analysis Date: **5/25/2022 03:24 PM**
Client ID: Run ID: **ICPMS3_220525A** SeqNo: **8455599** Prep Date: **5/25/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.09965	0.010	0.1	0	99.6	80-120	0			
Antimony	0.1001	0.0050	0.1	0	100	80-120	0			
Arsenic	0.09536	0.0050	0.1	0	95.4	80-120	0			
Barium	0.09923	0.0050	0.1	0	99.2	80-120	0			
Beryllium	0.1008	0.0020	0.1	0	101	80-120	0			
Boron	0.5255	0.020	0.5	0	105	80-120	0			
Cadmium	0.09979	0.0020	0.1	0	99.8	80-120	0			
Chromium	0.101	0.0050	0.1	0	101	80-120	0			
Copper	0.1065	0.0050	0.1	0	107	80-120	0			
Lead	0.09802	0.0050	0.1	0	98	80-120	0			
Nickel	0.1035	0.0050	0.1	0	104	80-120	0			
Selenium	0.09328	0.0050	0.1	0	93.3	80-120	0			
Silver	0.09466	0.0050	0.1	0	94.7	80-120	0			
Thallium	0.09612	0.0050	0.1	0	96.1	80-120	0			
Zinc	0.1063	0.010	0.1	0	106	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196876** Instrument ID **ICPMS3** Method: **SW6020B**

MS Sample ID: **22051619-03DMS** Units: **mg/L** Analysis Date: **5/25/2022 05:16 PM**
Client ID: Run ID: **ICPMS3_220525A** SeqNo: **8458411** Prep Date: **5/25/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.3377	0.010	0.1	0.2359	102	75-125	0			
Antimony	0.1052	0.0050	0.1	0.0000891	105	75-125	0			
Arsenic	0.0944	0.0050	0.1	0.0002442	94.2	75-125	0			
Barium	0.1159	0.0050	0.1	0.0148	101	75-125	0			
Beryllium	0.1016	0.0020	0.1	0.0000363	102	75-125	0			
Boron	0.5462	0.020	0.5	0.01397	106	75-125	0			
Cadmium	0.1046	0.0020	0.1	0.0000682	105	75-125	0			
Chromium	0.09977	0.0050	0.1	0.001273	98.5	75-125	0			
Copper	0.1062	0.0050	0.1	0.00145	105	75-125	0			
Lead	0.09816	0.0050	0.1	0.0002233	97.9	75-125	0			
Nickel	0.1021	0.0050	0.1	0.0006545	101	75-125	0			
Selenium	0.09335	0.0050	0.1	0.0000979	93.3	75-125	0			
Silver	0.09725	0.0050	0.1	0.0000033	97.2	75-125	0			
Thallium	0.09541	0.0050	0.1	0.0000088	95.4	75-125	0			
Zinc	0.1045	0.010	0.1	0.001261	103	75-125	0			

MSD Sample ID: **22051619-03DMSD** Units: **mg/L** Analysis Date: **5/25/2022 05:18 PM**
Client ID: Run ID: **ICPMS3_220525A** SeqNo: **8458412** Prep Date: **5/25/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.3542	0.010	0.1	0.2359	118	75-125	0.3377	4.78	20	
Antimony	0.104	0.0050	0.1	0.0000891	104	75-125	0.1052	1.14	20	
Arsenic	0.09267	0.0050	0.1	0.0002442	92.4	75-125	0.0944	1.85	20	
Barium	0.1149	0.0050	0.1	0.0148	100	75-125	0.1159	0.845	20	
Beryllium	0.1002	0.0020	0.1	0.0000363	100	75-125	0.1016	1.35	20	
Boron	0.5453	0.020	0.5	0.01397	106	75-125	0.5462	0.148	20	
Cadmium	0.1038	0.0020	0.1	0.0000682	104	75-125	0.1046	0.806	20	
Chromium	0.09907	0.0050	0.1	0.001273	97.8	75-125	0.09977	0.698	20	
Copper	0.1039	0.0050	0.1	0.00145	102	75-125	0.1062	2.13	20	
Lead	0.09721	0.0050	0.1	0.0002233	97	75-125	0.09816	0.966	20	
Nickel	0.1001	0.0050	0.1	0.0006545	99.4	75-125	0.1021	1.99	20	
Selenium	0.09347	0.0050	0.1	0.0000979	93.4	75-125	0.09335	0.13	20	
Silver	0.09611	0.0050	0.1	0.0000033	96.1	75-125	0.09725	1.18	20	
Thallium	0.09397	0.0050	0.1	0.0000088	94	75-125	0.09541	1.52	20	
Zinc	0.1089	0.010	0.1	0.001261	108	75-125	0.1045	4.11	20	

The following samples were analyzed in this batch:

22051511-02D	22051511-04D	22051511-06D
22051511-07D	22051511-10D	22051511-11D
22051511-14D		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **197094** Instrument ID **ICPMS3** Method: **SW6020B**

MBLK Sample ID: **MBLK-197094-197094** Units: **mg/L** Analysis Date: **5/31/2022 03:47 PM**
Client ID: Run ID: **ICPMS3_220531A** SeqNo: **8471604** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	ND	0.010								
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Cadmium	ND	0.0020								
Chromium	ND	0.0050								
Copper	ND	0.0050								
Lead	ND	0.0050								
Nickel	ND	0.0050								
Selenium	ND	0.0050								
Silver	ND	0.0050								
Thallium	ND	0.0050								
Zinc	ND	0.010								

MBLK Sample ID: **MBLK-197094-197094** Units: **mg/L** Analysis Date: **6/1/2022 12:20 PM**
Client ID: Run ID: **ICPMS3_220601A** SeqNo: **8474214** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	ND	0.020								

LCS Sample ID: **LCS-197094-197094** Units: **mg/L** Analysis Date: **5/31/2022 03:48 PM**
Client ID: Run ID: **ICPMS3_220531A** SeqNo: **8471605** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	0.1029	0.010	0.1	0	103	80-120	0			
Antimony	0.09689	0.0050	0.1	0	96.9	80-120	0			
Arsenic	0.09534	0.0050	0.1	0	95.3	80-120	0			
Barium	0.09894	0.0050	0.1	0	98.9	80-120	0			
Beryllium	0.09581	0.0020	0.1	0	95.8	80-120	0			
Cadmium	0.0992	0.0020	0.1	0	99.2	80-120	0			
Chromium	0.1019	0.0050	0.1	0	102	80-120	0			
Copper	0.1075	0.0050	0.1	0	108	80-120	0			
Lead	0.09724	0.0050	0.1	0	97.2	80-120	0			
Nickel	0.1026	0.0050	0.1	0	103	80-120	0			
Selenium	0.08974	0.0050	0.1	0	89.7	80-120	0			
Silver	0.09505	0.0050	0.1	0	95	80-120	0			
Thallium	0.09462	0.0050	0.1	0	94.6	80-120	0			
Zinc	0.1016	0.010	0.1	0	102	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **197094** Instrument ID **ICPMS3** Method: **SW6020B**

LCS Sample ID: **LCS-197094-197094** Units: **mg/L** Analysis Date: **6/1/2022 12:22 PM**
Client ID: Run ID: **ICPMS3_220601A** SeqNo: **8474215** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	0.5048	0.020	0.5	0	101	80-120	0			

MS Sample ID: **22051853-09DMS** Units: **mg/L** Analysis Date: **5/31/2022 05:38 PM**
Client ID: Run ID: **ICPMS3_220531A** SeqNo: **8472567** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	3.168	0.010	0.1	2.153	1010	75-125	0			SEO
Antimony	0.09893	0.0050	0.1	0.0000319	98.9	75-125	0			
Arsenic	0.09945	0.0050	0.1	0.001066	98.4	75-125	0			
Barium	0.2846	0.0050	0.1	0.1854	99.2	75-125	0			
Beryllium	0.09961	0.0020	0.1	0.0001166	99.5	75-125	0			
Cadmium	0.09942	0.0020	0.1	0.000033	99.4	75-125	0			
Chromium	0.104	0.0050	0.1	0.003516	100	75-125	0			
Copper	0.1128	0.0050	0.1	0.008994	104	75-125	0			
Lead	0.101	0.0050	0.1	0.001884	99.2	75-125	0			
Nickel	0.104	0.0050	0.1	0.002879	101	75-125	0			
Selenium	0.09213	0.0050	0.1	0.0000924	92	75-125	0			
Silver	0.09291	0.0050	0.1	0.0000132	92.9	75-125	0			
Thallium	0.09726	0.0050	0.1	0.0000088	97.3	75-125	0			
Zinc	0.1137	0.010	0.1	0.01402	99.7	75-125	0			

MS Sample ID: **22051853-09DMS** Units: **mg/L** Analysis Date: **6/1/2022 12:25 PM**
Client ID: Run ID: **ICPMS3_220601A** SeqNo: **8474217** Prep Date: **5/29/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	0.5844	0.020	0.5	0.07552	102	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **197094** Instrument ID **ICPMS3** Method: **SW6020B**

MSD	Sample ID: **22051853-09DMSD**				Units: **mg/L**			Analysis Date: **5/31/2022 05:40 PM**		
Client ID:	Run ID: **ICPMS3_220531A**				SeqNo: **8472568**		Prep Date: **5/29/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Aluminum	3.157	0.010	0.1	2.153	1000	75-125	3.168	0.352	20	SEO
Antimony	0.09732	0.0050	0.1	0.0000319	97.3	75-125	0.09893	1.64	20	
Arsenic	0.09934	0.0050	0.1	0.001066	98.3	75-125	0.09945	0.11	20	
Barium	0.2862	0.0050	0.1	0.1854	101	75-125	0.2846	0.555	20	
Beryllium	0.1012	0.0020	0.1	0.0001166	101	75-125	0.09961	1.61	20	
Cadmium	0.09833	0.0020	0.1	0.000033	98.3	75-125	0.09942	1.11	20	
Chromium	0.1047	0.0050	0.1	0.003516	101	75-125	0.104	0.656	20	
Copper	0.1123	0.0050	0.1	0.008994	103	75-125	0.1128	0.428	20	
Lead	0.0999	0.0050	0.1	0.001884	98	75-125	0.101	1.14	20	
Nickel	0.1027	0.0050	0.1	0.002879	99.9	75-125	0.104	1.18	20	
Selenium	0.09594	0.0050	0.1	0.0000924	95.9	75-125	0.09213	4.05	20	
Silver	0.09221	0.0050	0.1	0.0000132	92.2	75-125	0.09291	0.759	20	
Thallium	0.09764	0.0050	0.1	0.0000088	97.6	75-125	0.09726	0.389	20	
Zinc	0.1153	0.010	0.1	0.01402	101	75-125	0.1137	1.38	20	

MSD	Sample ID: **22051853-09DMSD**				Units: **mg/L**			Analysis Date: **6/1/2022 12:27 PM**		
Client ID:	Run ID: **ICPMS3_220601A**				SeqNo: **8474218**		Prep Date: **5/29/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Boron	0.5812	0.020	0.5	0.07552	101	75-125	0.5844	0.549	20	

The following samples were analyzed in this batch: 22051511-16D

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

MBLK	Sample ID: **MBLK-196606-196606**				Units: **ng/L**			Analysis Date: **5/24/2022 11:52 AM**		
Client ID:		Run ID: **LCMS1_220523C**			SeqNo: **8450642**		Prep Date: **5/20/2022**		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	ND	5.0								
Fluorotelomer Sulphonic Acid 6:2 (FtS	ND	5.0								
Fluorotelomer Sulphonic Acid 8:2 (FtS	ND	5.0								
Perfluorobutanesulfonic Acid (PFBS)	ND	5.0								
Perfluorobutanoic Acid (PFBA)	ND	5.0								
Perfluorodecanesulfonic Acid (PFDS)	ND	5.0								
Perfluorodecanoic Acid (PFDA)	ND	5.0								
Perfluorododecanoic Acid (PFDoA)	ND	5.0								
Perfluoroheptanesulfonic Acid (PFHpS	ND	5.0								
Perfluoroheptanoic Acid (PFHpA)	ND	5.0								
Perfluorohexanesulfonic Acid (PFHxS)	ND	5.0								
Perfluorohexanoic Acid (PFHxA)	ND	5.0								
Perfluorononanesulfonic Acid (PFNS)	ND	5.0								
Perfluorononanoic Acid (PFNA)	ND	5.0								
Perfluorooctanesulfonamide (PFOSA)	ND	5.0								
Perfluorooctanesulfonic Acid (PFOS)	ND	2.0								
Perfluorooctanoic Acid (PFOA)	ND	2.0								
Perfluoropentanesulfonic Acid (PFPeS	ND	5.0								
Perfluoropentanoic Acid (PFPeA)	ND	5.0								
Perfluorotetradecanoic Acid (PFTeA)	ND	5.0								
Perfluorotridecanoic Acid (PFTriA)	ND	5.0								
Perfluoroundecanoic Acid (PFUnA)	ND	5.0								
N-Ethylperfluorooctanesulfonamidoace	ND	5.0								
N-Methylperfluorooctanesulfonamidoa	0.6528	5.0								J
Hexafluoropropylene oxide dimer acid	ND	5.0								
4,8-Dioxa-3H-perfluorononanoic Acid (	ND	5.0								
11Cl-Pf3OUdS	ND	5.0								
9Cl-PF3ONS	ND	5.0								
Surr: 13C2-FtS 4:2	*123.3*	0	*149.4*	0	*82.5*	*50-150*	0			
Surr: 13C2-FtS 6:2	*150.7*	0	*152*	0	*99.2*	*50-150*	0			
Surr: 13C2-FtS 8:2	*144.3*	0	*153.3*	0	*94.2*	*50-150*	0			
Surr: 13C2-PFDA	*138.9*	0	*160*	0	*86.8*	*50-150*	0			
Surr: 13C2-PFDoA	*141.8*	0	*160*	0	*88.6*	*50-150*	0			
Surr: 13C2-PFHxA	*133.1*	0	*160*	0	*83.2*	*50-150*	0			
Surr: 13C2-PFTeA	*144.7*	0	*160*	0	*90.5*	*50-150*	0			
Surr: 13C2-PFUnA	*143.5*	0	*160*	0	*89.7*	*50-150*	0			
Surr: 13C3-HFPO-DA	*131.4*	0	*160*	0	*82.1*	*50-150*	0			
Surr: 13C3-PFBS	*136.1*	0	*148.8*	0	*91.4*	*50-150*	0			
Surr: 13C4-PFBA	*142.1*	0	*160*	0	*88.8*	*50-150*	0			
Surr: 13C4-PFHpA	*143.9*	0	*160*	0	*90*	*50-150*	0			
Surr: 13C4-PFOA	*134.9*	0	*160*	0	*84.3*	*50-150*	0			
Surr: 13C4-PFOS	*134.2*	0	*152.8*	0	*87.8*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C5-PFNA	*156.2*	0	*160*	0	*97.6*	*50-150*	0
Surr: 13C5-PFPeA	*147.3*	0	*160*	0	*92.1*	*50-150*	0
Surr: 18O2-PFHxS	*156.1*	0	*151.2*	0	*103*	*50-150*	0
Surr: d5-N-EtFOSAA	*150.8*	0	*160*	0	*94.2*	*50-150*	0
Surr: d3-N-MeFOSAA	*140.4*	0	*160*	0	*87.8*	*50-150*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

LCS	Sample ID: **LCS-196606-196606**				Units: **ng/L**			Analysis Date: **5/24/2022 07:17 AM**			
Client ID:		Run ID: **LCMS1_220523C**			SeqNo: **8450612**			Prep Date: **5/20/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	37.6	5.0	29.9	0	126	63-143	0			
Fluorotelomer Sulphonic Acid 6:2 (FtS	40.82	5.0	30.3	0	135	63-162	0			
Fluorotelomer Sulphonic Acid 8:2 (FtS	28.09	5.0	30.7	0	91.5	61-165	0			
Perfluorobutanesulfonic Acid (PFBS)	36	5.0	28.3	0	127	72-130	0			
Perfluorobutanoic Acid (PFBA)	39.86	5.0	32	0	125	73-129	0			
Perfluorodecanesulfonic Acid (PFDS)	38.9	5.0	30.8	0	126	53-142	0			
Perfluorodecanoic Acid (PFDA)	37.05	5.0	32	0	116	71-129	0			
Perfluorododecanoic Acid (PFDoA)	32.35	5.0	32	0	101	72-134	0			
Perfluoroheptanesulfonic Acid (PFHpS	36.48	5.0	30.5	0	120	69-134	0			
Perfluoroheptanoic Acid (PFHpA)	40.93	5.0	32	0	128	72-130	0			
Perfluorohexanesulfonic Acid (PFHxS)	35.38	5.0	29.1	0	122	68-131	0			
Perfluorohexanoic Acid (PFHxA)	34.2	5.0	32	0	107	72-129	0			
Perfluorononanesulfonic Acid (PFNS)	32.62	5.0	30.7	0	106	69-127	0			
Perfluorononanoic Acid (PFNA)	29.36	5.0	32	0	91.8	69-130	0			
Perfluorooctanesulfonamide (PFOSA)	35.51	5.0	32	0	111	67-137	0			
Perfluorooctanesulfonic Acid (PFOS)	30.46	2.0	29.7	0	103	65-140	0			
Perfluorooctanoic Acid (PFOA)	34.79	2.0	32	0	109	71-133	0			
Perfluoropentanesulfonic Acid (PFPeS	37.51	5.0	30	0	125	71-127	0			
Perfluoropentanoic Acid (PFPeA)	38.23	5.0	32	0	119	72-129	0			
Perfluorotetradecanoic Acid (PFTeA)	37.75	5.0	32	0	118	71-132	0			
Perfluorotridecanoic Acid (PFTriA)	40.34	5.0	32	0	126	65-144	0			
Perfluoroundecanoic Acid (PFUnA)	30.34	5.0	32	0	94.8	69-133	0			
N-Ethylperfluorooctanesulfonamidoace	42.07	5.0	32	0	131	61-135	0			
N-Methylperfluorooctanesulfonamidoa	36.06	5.0	32	0	113	65-136	0			
Hexafluoropropylene oxide dimer acid	38.55	5.0	32	0	120	70-130	0			
4,8-Dioxa-3H-perfluorononanoic Acid (	29.44	5.0	30.1	0	97.8	70-130	0			
9Cl-PF3ONS	37.6	5.0	29.8	0	126	70-130	0			
Surr: 13C2-FtS 4:2	*107.6*	0	*149.4*	0	*72*	*50-150*	0			
Surr: 13C2-FtS 6:2	*103.6*	0	*152*	0	*68.2*	*50-150*	0			
Surr: 13C2-FtS 8:2	*131.8*	0	*153.3*	0	*86*	*50-150*	0			
Surr: 13C2-PFDA	*128.2*	0	*160*	0	*80.1*	*50-150*	0			
Surr: 13C2-PFDoA	*112.4*	0	*160*	0	*70.2*	*50-150*	0			
Surr: 13C2-PFHxA	*144.1*	0	*160*	0	*90.1*	*50-150*	0			
Surr: 13C2-PFTeA	*129.2*	0	*160*	0	*80.8*	*50-150*	0			
Surr: 13C2-PFUnA	*166.5*	0	*160*	0	*104*	*50-150*	0			
Surr: 13C3-HFPO-DA	*114.7*	0	*160*	0	*71.7*	*50-150*	0			
Surr: 13C3-PFBS	*119.9*	0	*148.8*	0	*80.6*	*50-150*	0			
Surr: 13C4-PFBA	*135.7*	0	*160*	0	*84.8*	*50-150*	0			
Surr: 13C4-PFHpA	*129.3*	0	*160*	0	*80.8*	*50-150*	0			
Surr: 13C4-PFOA	*156.3*	0	*160*	0	*97.7*	*50-150*	0			
Surr: 13C4-PFOS	*121.5*	0	*152.8*	0	*79.5*	*50-150*	0			
Surr: 13C5-PFNA	*140.2*	0	*160*	0	*87.6*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **196606**	Instrument ID **LCMS1**		Method: **E537 Mod**				
Surr: 13C5-PFPeA	*122.5*	0	*160*	0	*76.5*	*50-150*	0
Surr: 13C8-FOSA	*103.6*	0	*160*	0	*64.7*	*50-150*	0
Surr: 18O2-PFHxS	*114.6*	0	*151.2*	0	*75.8*	*50-150*	0
Surr: d5-N-EtFOSAA	*125.6*	0	*160*	0	*78.5*	*50-150*	0
Surr: d3-N-MeFOSAA	*100.9*	0	*160*	0	*63*	*50-150*	0

LCS Sample ID: **LCS-196606-196606** Units: **ng/L** Analysis Date: **5/25/2022 03:09 AM**

Client ID: Run ID: **LCMS1_220524B** SeqNo: **8454692** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
11Cl-Pf3OUdS	30.76	5.0	30.1	0	102	70-130	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

MS Sample ID: **22051501-01AMS** Units: **ng/L** Analysis Date: **5/24/2022 09:22 AM**
Client ID: Run ID: **LCMS1_220523C** SeqNo: **8450626** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	32.99	5.1	30.46	0.03274	108	63-143	0			
Fluorotelomer Sulphonic Acid 6:2 (FtS	36.59	5.1	30.87	1.201	115	63-162	0			
Fluorotelomer Sulphonic Acid 8:2 (FtS	46.77	5.1	31.28	1.483	145	61-165	0			
Perfluorobutanesulfonic Acid (PFBS)	38.49	5.1	28.83	2.252	126	72-130	0			
Perfluorobutanoic Acid (PFBA)	52.29	5.1	32.6	3.306	150	73-129	0			S
Perfluorodecanesulfonic Acid (PFDS)	34.52	5.1	31.38	0	110	53-142	0			
Perfluorodecanoic Acid (PFDA)	38.11	5.1	32.6	-0.7071	119	71-129	0			
Perfluorododecanoic Acid (PFDoA)	34.89	5.1	32.6	0.1015	107	72-134	0			
Perfluoroheptanesulfonic Acid (PFHpS	42.26	5.1	31.07	1.526	131	69-134	0			
Perfluoroheptanoic Acid (PFHpA)	42.68	5.1	32.6	3.509	120	72-130	0			
Perfluorohexanesulfonic Acid (PFHxS)	35.8	5.1	29.65	1.192	117	68-131	0			
Perfluorohexanoic Acid (PFHxA)	41.19	5.1	32.6	5.798	109	72-129	0			
Perfluorononanesulfonic Acid (PFNS)	32.11	5.1	31.28	0	103	69-127	0			
Perfluorononanoic Acid (PFNA)	35.21	5.1	32.6	0.5402	106	69-130	0			
Perfluorooctanesulfonamide (PFOSA)	39.33	5.1	32.6	0.3012	120	67-137	0			
Perfluorooctanesulfonic Acid (PFOS)	36.07	2.0	30.26	2.874	110	65-140	0			
Perfluorooctanoic Acid (PFOA)	48.6	2.0	32.6	8.112	124	71-133	0			
Perfluoropentanesulfonic Acid (PFPeS	40.42	5.1	30.56	0.1899	132	71-127	0			S
Perfluoropentanoic Acid (PFPeA)	46.35	5.1	32.6	6.786	121	72-129	0			
Perfluorotetradecanoic Acid (PFTeA)	37.43	5.1	32.6	0.2259	114	71-132	0			
Perfluorotridecanoic Acid (PFTriA)	31.08	5.1	32.6	0.1179	95	65-144	0			
Perfluoroundecanoic Acid (PFUnA)	38.26	5.1	32.6	-0.7399	120	69-133	0			
N-Ethylperfluorooctanesulfonamidoace	36.05	5.1	32.6	0.1244	110	61-135	0			
N-Methylperfluorooctanesulfonamidoa	42.81	5.1	32.6	0.6155	129	65-136	0			
Hexafluoropropylene oxide dimer acid	39.15	5.1	32.6	0.1637	120	70-130	0			
4,8-Dioxa-3H-perfluorononanoic Acid (	37.69	5.1	30.66	0.03274	123	70-130	0			
11Cl-Pf3OUdS	31.12	5.1	30.66	0.02292	101	70-130	0			
9Cl-PF3ONS	31.12	5.1	30.36	0.03274	102	70-130	0			
Surr: 13C2-FtS 4:2	*145.3*	0	*152.2*	0	*95.4*	*50-150*	0			
Surr: 13C2-FtS 6:2	*150.8*	0	*154.8*	0	*97.4*	*50-150*	0			
Surr: 13C2-FtS 8:2	*183.3*	0	*156.2*	0	*117*	*50-150*	0			
Surr: 13C2-PFDA	*153.6*	0	*163*	0	*94.2*	*50-150*	0			
Surr: 13C2-PFDoA	*133.6*	0	*163*	0	*81.9*	*50-150*	0			
Surr: 13C2-PFHxA	*147.2*	0	*163*	0	*90.3*	*50-150*	0			
Surr: 13C2-PFTeA	*149*	0	*163*	0	*91.4*	*50-150*	0			
Surr: 13C2-PFUnA	*140.1*	0	*163*	0	*85.9*	*50-150*	0			
Surr: 13C3-HFPO-DA	*150.7*	0	*163*	0	*92.4*	*50-150*	0			
Surr: 13C3-PFBS	*124.9*	0	*151.6*	0	*82.4*	*50-150*	0			
Surr: 13C4-PFBA	*135.8*	0	*163*	0	*83.3*	*50-150*	0			
Surr: 13C4-PFHpA	*124.6*	0	*163*	0	*76.5*	*50-150*	0			
Surr: 13C4-PFOA	*132.7*	0	*163*	0	*81.4*	*50-150*	0			
Surr: 13C4-PFOS	*139*	0	*155.7*	0	*89.3*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C5-PFNA	*132.9*	0	*163*	0	*81.5*	*50-150*	0
Surr: 13C5-PFPeA	*133.5*	0	*163*	0	*81.9*	*50-150*	0
Surr: 13C8-FOSA	*119.3*	0	*163*	0	*73.2*	*50-150*	0
Surr: 18O2-PFHxS	*117.2*	0	*154*	0	*76.1*	*50-150*	0
Surr: d5-N-EtFOSAA	*144.5*	0	*163*	0	*88.7*	*50-150*	0
Surr: d3-N-MeFOSAA	*151.4*	0	*163*	0	*92.9*	*50-150*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

MSD	Sample ID: **22051501-01AMSD**				Units: **ng/L**			Analysis Date: **5/24/2022 09:30 AM**		
Client ID:		Run ID: **LCMS1_220523C**			SeqNo: **8450627**		Prep Date: **5/20/2022**		DF: **1**	

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	35.93	5.1	30.32	0.03274	118	63-143	32.99	8.53	30	
Fluorotelomer Sulphonic Acid 6:2 (FtS	36.62	5.1	30.72	1.201	115	63-162	36.59	0.0751	30	
Fluorotelomer Sulphonic Acid 8:2 (FtS	41.04	5.1	31.13	1.483	127	61-165	46.77	13.1	30	
Perfluorobutanesulfonic Acid (PFBS)	34.97	5.1	28.69	2.252	114	72-130	38.49	9.59	30	
Perfluorobutanoic Acid (PFBA)	44.11	5.1	32.45	3.306	126	73-129	52.29	17	30	
Perfluorodecanesulfonic Acid (PFDS)	34.79	5.1	31.23	0	111	53-142	34.52	0.782	30	
Perfluorodecanoic Acid (PFDA)	37.16	5.1	32.45	-0.7071	117	71-129	38.11	2.52	30	
Perfluorododecanoic Acid (PFDoA)	31.39	5.1	32.45	0.1015	96.4	72-134	34.89	10.6	30	
Perfluoroheptanesulfonic Acid (PFHpS	33.96	5.1	30.92	1.526	105	69-134	42.26	21.8	30	
Perfluoroheptanoic Acid (PFHpA)	43.12	5.1	32.45	3.509	122	72-130	42.68	1.03	30	
Perfluorohexanesulfonic Acid (PFHxS)	35.29	5.1	29.5	1.192	116	68-131	35.8	1.44	30	
Perfluorohexanoic Acid (PFHxA)	38.79	5.1	32.45	5.798	102	72-129	41.19	6.01	30	
Perfluorononanesulfonic Acid (PFNS)	37.18	5.1	31.13	0	119	69-127	32.11	14.6	30	
Perfluorononanoic Acid (PFNA)	34.08	5.1	32.45	0.5402	103	69-130	35.21	3.27	30	
Perfluorooctanesulfonamide (PFOSA)	39.94	5.1	32.45	0.3012	122	67-137	39.33	1.53	30	
Perfluorooctanesulfonic Acid (PFOS)	34.06	2.0	30.11	2.874	104	65-140	36.07	5.74	30	
Perfluorooctanoic Acid (PFOA)	44.66	2.0	32.45	8.112	113	71-133	48.6	8.44	30	
Perfluoropentanesulfonic Acid (PFPeS	28.75	5.1	30.42	0.1899	93.9	71-127	40.42	33.7	30	R
Perfluoropentanoic Acid (PFPeA)	44.37	5.1	32.45	6.786	116	72-129	46.35	4.38	30	
Perfluorotetradecanoic Acid (PFTeA)	33.63	5.1	32.45	0.2259	103	71-132	37.43	10.7	30	
Perfluorotridecanoic Acid (PFTriA)	34.82	5.1	32.45	0.1179	107	65-144	31.08	11.3	30	
Perfluoroundecanoic Acid (PFUnA)	36.31	5.1	32.45	-0.7399	114	69-133	38.26	5.22	30	
N-Ethylperfluorooctanesulfonamidoace	37	5.1	32.45	0.1244	114	61-135	36.05	2.59	30	
N-Methylperfluorooctanesulfonamidoa	37.81	5.1	32.45	0.6155	115	65-136	42.81	12.4	30	
Hexafluoropropylene oxide dimer acid	35.54	5.1	32.45	0.1637	109	70-130	39.15	9.65	30	
4,8-Dioxa-3H-perfluorononanoic Acid (	31.51	5.1	30.52	0.03274	103	70-130	37.69	17.9	30	
11Cl-Pf3OUdS	29.44	5.1	30.52	0.02292	96.4	70-130	31.12	5.57	30	
9Cl-PF3ONS	30.8	5.1	30.21	0.03274	102	70-130	31.12	1.03	30	
Surr: 13C2-FtS 4:2	*125.9*	0	*151.5*	0	*83.1*	*50-150*	145.3	*14.3*	*30*	
Surr: 13C2-FtS 6:2	*150.1*	0	*154.1*	0	*97.4*	*50-150*	150.8	*0.467*	*30*	
Surr: 13C2-FtS 8:2	*194.9*	0	*155.4*	0	*125*	*50-150*	183.3	*6.14*	*30*	
Surr: 13C2-PFDA	*139.8*	0	*162.2*	0	*86.2*	*50-150*	153.6	*9.39*	*30*	
Surr: 13C2-PFDoA	*124.7*	0	*162.2*	0	*76.9*	*50-150*	133.6	*6.85*	*30*	
Surr: 13C2-PFHxA	*118.4*	0	*162.2*	0	*73*	*50-150*	147.2	*21.7*	*30*	
Surr: 13C2-PFTeA	*124*	0	*162.2*	0	*76.5*	*50-150*	149	*18.3*	*30*	
Surr: 13C2-PFUnA	*132.1*	0	*162.2*	0	*81.4*	*50-150*	140.1	*5.84*	*30*	
Surr: 13C3-HFPO-DA	*122.6*	0	*162.2*	0	*75.6*	*50-150*	150.7	*20.6*	*30*	
Surr: 13C3-PFBS	*111.2*	0	*150.9*	0	*73.7*	*50-150*	124.9	*11.6*	*30*	
Surr: 13C4-PFBA	*124.6*	0	*162.2*	0	*76.8*	*50-150*	135.8	*8.65*	*30*	
Surr: 13C4-PFHpA	*110*	0	*162.2*	0	*67.8*	*50-150*	124.6	*12.5*	*30*	
Surr: 13C4-PFOA	*116.9*	0	*162.2*	0	*72.1*	*50-150*	132.7	*12.6*	*30*	
Surr: 13C4-PFOS	*123.5*	0	*154.9*	0	*79.7*	*50-150*	139	*11.8*	*30*	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196606** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C5-PFNA	*129.3*	0	*162.2*	0	*79.7*	*50-150*	132.9	*2.71*	*30*
Surr: 13C5-PFPeA	*126.7*	0	*162.2*	0	*78.1*	*50-150*	133.5	*5.17*	*30*
Surr: 13C8-FOSA	*110.2*	0	*162.2*	0	*67.9*	*50-150*	119.3	*7.92*	*30*
Surr: 18O2-PFHxS	*118.4*	0	*153.3*	0	*77.2*	*50-150*	117.2	*1*	*30*
Surr: d5-N-EtFOSAA	*133.1*	0	*162.2*	0	*82*	*50-150*	144.5	*8.25*	*30*
Surr: d3-N-MeFOSAA	*159.4*	0	*162.2*	0	*98.3*	*50-150*	151.4	*5.14*	*30*

The following samples were analyzed in this batch:

22051511-01E	22051511-02E	22051511-03E
22051511-04E	22051511-05E	22051511-06E
22051511-07E		

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196707** Instrument ID **LCMS1** Method: **E537 Mod**

MS	Sample ID: **22051271-01B MS**				Units: **ng/L**			Analysis Date: **5/25/2022 06:19 AM**			
Client ID:		Run ID: **LCMS1_220524B**			SeqNo: **8454713**		Prep Date: **5/23/2022**		DF: **1**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	41.58	4.7	28.03	0	148	63-143	0			S
Fluorotelomer Sulphonic Acid 6:2 (FtS	38.96	4.7	28.4	4.299	122	63-162	0			
Fluorotelomer Sulphonic Acid 8:2 (FtS	29.79	4.7	28.78	0	104	61-165	0			
Perfluorobutanesulfonic Acid (PFBS)	31.51	4.7	26.53	0	119	72-130	0			
Perfluorobutanoic Acid (PFBA)	39.95	4.7	30	0	133	73-129	0			S
Perfluorodecanesulfonic Acid (PFDS)	29.6	4.7	28.87	0	103	53-142	0			
Perfluorodecanoic Acid (PFDA)	36.36	4.7	30	0	121	71-129	0			
Perfluorododecanoic Acid (PFDoA)	32.82	4.7	30	0	109	72-134	0			
Perfluoroheptanesulfonic Acid (PFHpS	26.22	4.7	28.59	0	91.7	69-134	0			
Perfluoroheptanoic Acid (PFHpA)	34.86	4.7	30	0	116	72-130	0			
Perfluorohexanesulfonic Acid (PFHxS)	31.89	4.7	27.28	0	117	68-131	0			
Perfluorohexanoic Acid (PFHxA)	33.46	4.7	30	0	112	72-129	0			
Perfluorononanesulfonic Acid (PFNS)	40.59	4.7	28.78	0	141	69-127	0			S
Perfluorononanoic Acid (PFNA)	31.84	4.7	30	0	106	69-130	0			
Perfluorooctanesulfonamide (PFOSA)	39.55	4.7	30	0	132	67-137	0			
Perfluorooctanesulfonic Acid (PFOS)	30.73	1.9	27.84	1.158	106	65-140	0			
Perfluorooctanoic Acid (PFOA)	40.78	1.9	30	0	136	71-133	0			S
Perfluoropentanesulfonic Acid (PFPeS	26.87	4.7	28.12	0	95.6	71-127	0			
Perfluoropentanoic Acid (PFPeA)	37.31	4.7	30	0	124	72-129	0			
Perfluorotetradecanoic Acid (PFTeA)	34.08	4.7	30	0	114	71-132	0			
Perfluorotridecanoic Acid (PFTriA)	43.24	4.7	30	0	144	65-144	0			S
Perfluoroundecanoic Acid (PFUnA)	32.9	4.7	30	0	110	69-133	0			
N-Ethylperfluorooctanesulfonamidoace	32.4	4.7	30	1.66	102	61-135	0			
N-Methylperfluorooctanesulfonamidoa	46.48	4.7	30	0	155	65-136	0			S
Hexafluoropropylene oxide dimer acid	36.89	4.7	30	0	123	70-130	0			
4,8-Dioxa-3H-perfluorononanoic Acid (	23.98	4.7	28.22	0	85	70-130	0			
11Cl-Pf3OUdS	28.31	4.7	28.22	0	100	70-130	0			
9Cl-PF3ONS	42.95	4.7	27.93	0	154	70-130	0			S
Surr: 13C2-FtS 4:2	*122.1*	0	*140.1*	0	*87.2*	*50-150*	0			
Surr: 13C2-FtS 6:2	*124.6*	0	*142.5*	0	*87.5*	*50-150*	0			
Surr: 13C2-FtS 8:2	*111.8*	0	*143.7*	0	*77.8*	*50-150*	0			
Surr: 13C2-PFDA	*107.5*	0	*150*	0	*71.7*	*50-150*	0			
Surr: 13C2-PFDoA	*95.53*	0	*150*	0	*63.7*	*50-150*	0			
Surr: 13C2-PFHxA	*124.2*	0	*150*	0	*82.8*	*50-150*	0			
Surr: 13C2-PFTeA	*57.36*	0	*150*	0	*38.2*	*50-150*	0			*S*
Surr: 13C2-PFUnA	*128.2*	0	*150*	0	*85.5*	*50-150*	0			
Surr: 13C3-HFPO-DA	*119.7*	0	*150*	0	*79.8*	*50-150*	0			
Surr: 13C3-PFBS	*119.6*	0	*139.5*	0	*85.7*	*50-150*	0			
Surr: 13C4-PFBA	*136.4*	0	*150*	0	*91*	*50-150*	0			
Surr: 13C4-PFHpA	*135.3*	0	*150*	0	*90.2*	*50-150*	0			
Surr: 13C4-PFOA	*137.3*	0	*150*	0	*91.5*	*50-150*	0			
Surr: 13C4-PFOS	*115.7*	0	*143.2*	0	*80.8*	*50-150*	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **196707** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C5-PFNA	*164.4*	0	*150*	0	*110*	*50-150*	0
Surr: 13C5-PFPeA	*129.5*	0	*150*	0	*86.4*	*50-150*	0
Surr: 13C8-FOSA	*169.8*	0	*150*	0	*113*	*50-150*	0
Surr: 18O2-PFHxS	*146.5*	0	*141.7*	0	*103*	*50-150*	0
Surr: d5-N-EtFOSAA	*157.4*	0	*150*	0	*105*	*50-150*	0
Surr: d3-N-MeFOSAA	*103.9*	0	*150*	0	*69.3*	*50-150*	0

MS Sample ID: **22051271-01B MS** Units: **ng/L** Analysis Date: **5/25/2022 12:40 PM**

Client ID: Run ID: **LCMS1_220524B** SeqNo: **8454756** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Perfluoroheptanesulfonic Acid (PFHpS	23.96	4.7	28.59	0	83.8	69-134	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196707** Instrument ID **LCMS1** Method: **E537 Mod**

DUP Sample ID: **22051087-02A DUP** Units: **ng/L** Analysis Date: **5/25/2022 06:27 AM**

Client ID: Run ID: **LCMS1_220524B** SeqNo: **8454714** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Fluorotelomer Sulphonic Acid 4:2 (FtS	ND	5.0	0	0	0	0-0	0	0	30	
Fluorotelomer Sulphonic Acid 6:2 (FtS	2.3	5.0	0	0	0	0-0	0	0	30	J
Fluorotelomer Sulphonic Acid 8:2 (FtS	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorobutanesulfonic Acid (PFBS)	2.439	5.0	0	0	0	0-0	1.907	0	30	J
Perfluorobutanoic Acid (PFBA)	7.067	5.0	0	0	0	0-0	7.444	5.19	30	
Perfluorodecanesulfonic Acid (PFDS)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorodecanoic Acid (PFDA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorododecanoic Acid (PFDoA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluoroheptanesulfonic Acid (PFHpS	2.579	5.0	0	0	0	0-0	0	0	30	J
Perfluoroheptanoic Acid (PFHpA)	3.51	5.0	0	0	0	0-0	3.632	0	30	J
Perfluorohexanesulfonic Acid (PFHxS)	2.747	5.0	0	0	0	0-0	1.914	0	30	J
Perfluorohexanoic Acid (PFHxA)	7.041	5.0	0	0	0	0-0	7.469	5.89	30	
Perfluorononanesulfonic Acid (PFNS)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorononanoic Acid (PFNA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorooctanesulfonamide (PFOSA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorooctanesulfonic Acid (PFOS)	1.21	2.0	0	0	0	0-0	2.006	0	30	J
Perfluorooctanoic Acid (PFOA)	12.23	2.0	0	0	0	0-0	11.28	8.03	30	
Perfluoropentanesulfonic Acid (PFPeS	ND	5.0	0	0	0	0-0	0	0	30	
Perfluoropentanoic Acid (PFPeA)	10.85	5.0	0	0	0	0-0	10.02	7.96	30	
Perfluorotetradecanoic Acid (PFTeA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluorotridecanoic Acid (PFTriA)	ND	5.0	0	0	0	0-0	0	0	30	
Perfluoroundecanoic Acid (PFUnA)	ND	5.0	0	0	0	0-0	0	0	30	
N-Ethylperfluorooctanesulfonamidoace	ND	5.0	0	0	0	0-0	0	0	30	
N-Methylperfluorooctanesulfonamidoa	ND	5.0	0	0	0	0-0	0	0	30	
Hexafluoropropylene oxide dimer acid	ND	5.0	0	0	0	0-0	0	0	30	
4,8-Dioxa-3H-perfluorononanoic Acid (	ND	5.0	0	0	0	0-0	0	0	30	
11Cl-Pf3OUdS	ND	5.0	0	0	0	0-0	0	0	30	
9Cl-PF3ONS	ND	5.0	0	0	0	0-0	0	0	30	
Surr: 13C2-FtS 4:2	*112.1*	0	*148.3*	0	*75.6*	*50-150*	150.8	*29.4*	*30*	
Surr: 13C2-FtS 6:2	*109.1*	0	*150.9*	0	*72.3*	*50-150*	141.3	*25.7*	*30*	
Surr: 13C2-FtS 8:2	*112.2*	0	*152.1*	0	*73.7*	*50-150*	229.4	*68.6*	*30*	*R*
Surr: 13C2-PFDA	*101.1*	0	*158.8*	0	*63.7*	*50-150*	115.7	*13.4*	*30*	
Surr: 13C2-PFDoA	*95.99*	0	*158.8*	0	*60.4*	*50-150*	94.53	*1.54*	*30*	
Surr: 13C2-PFHxA	*100.2*	0	*158.8*	0	*63.1*	*50-150*	95.01	*5.32*	*30*	
Surr: 13C2-PFTeA	*105*	0	*158.8*	0	*66.1*	*50-150*	122.4	*15.3*	*30*	
Surr: 13C2-PFUnA	*149.5*	0	*158.8*	0	*94.1*	*50-150*	118.7	*23*	*30*	
Surr: 13C3-HFPO-DA	*90.93*	0	*158.8*	0	*57.3*	*50-150*	97.28	*6.75*	*30*	
Surr: 13C3-PFBS	*109.6*	0	*147.7*	0	*74.2*	*50-150*	93.66	*15.7*	*30*	
Surr: 13C4-PFBA	*125.2*	0	*158.8*	0	*78.8*	*50-150*	99.01	*23.3*	*30*	
Surr: 13C4-PFHpA	*143.2*	0	*158.8*	0	*90.2*	*50-150*	103.3	*32.3*	*30*	*R*
Surr: 13C4-PFOA	*148.9*	0	*158.8*	0	*93.8*	*50-150*	97.45	*41.8*	*30*	*R*
Surr: 13C4-PFOS	*113.8*	0	*151.7*	0	*75*	*50-150*	91.73	*21.4*	*30*	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196707** Instrument ID **LCMS1** Method: **E537 Mod**

Surr: 13C5-PFNA	*132.5*	0	*158.8*	0	*83.5*	*50-150*	105.8	*22.4*	*30*	
Surr: 13C5-PFPeA	*108.4*	0	*158.8*	0	*68.2*	*50-150*	102.8	*5.26*	*30*	
Surr: 13C8-FOSA	*128.8*	0	*158.8*	0	*81.1*	*50-150*	99.84	*25.4*	*30*	
Surr: 18O2-PFHxS	*130.4*	0	*150.1*	0	*86.9*	*50-150*	80.01	*47.9*	*30*	*R*
Surr: d5-N-EtFOSAA	*152*	0	*158.8*	0	*95.7*	*50-150*	123.9	*20.4*	*30*	
Surr: d3-N-MeFOSAA	*84.71*	0	*158.8*	0	*53.3*	*50-150*	135.3	*46*	*30*	*R*

DUP Sample ID: **22051087-02A DUP** Units: **ng/L** Analysis Date: **5/25/2022 12:48 PM**

Client ID: Run ID: **LCMS1_220524B** SeqNo: **8454757** Prep Date: **5/23/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Perfluoroheptanesulfonic Acid (PFHpS	1.693	5.0	0	0	0	0-0	0	0	30	J

The following samples were analyzed in this batch:

22051511-08E	22051511-09E	22051511-10E
22051511-11E	22051511-12E	22051511-13A
22051511-14E	22051511-16E	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

MBLK Sample ID: **SBLKW1-196624-196624** Units: **µg/L** Analysis Date: **5/20/2022 03:54 PM**

Client ID: Run ID: **SVMS8_220520A** SeqNo: **8444873** Prep Date: **5/20/2022** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1`-Biphenyl	ND	5.0								
2,4,5-Trichlorophenol	ND	5.0								
2,4,6-Trichlorophenol	ND	5.0								
2,4-Dichlorophenol	ND	5.0								
2,4-Dimethylphenol	ND	5.0								
2,4-Dinitrophenol	ND	5.0								
2,4-Dinitrotoluene	ND	5.0								
2,6-Dinitrotoluene	ND	5.0								
2-Chloronaphthalene	ND	5.0								
2-Chlorophenol	ND	5.0								
2-Methylnaphthalene	ND	5.0								
2-Methylphenol	ND	5.0								
2-Nitroaniline	ND	5.0								
2-Nitrophenol	ND	5.0								
3&4-Methylphenol	ND	5.0								
3,3´-Dichlorobenzidine	ND	5.0								
3-Nitroaniline	ND	5.0								
4,6-Dinitro-2-methylphenol	ND	5.0								
4-Bromophenyl phenyl ether	ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	5.0								
4-Chlorophenyl phenyl ether	ND	5.0								
4-Nitroaniline	ND	5.0								
4-Nitrophenol	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Acetophenone	ND	1.0								
Anthracene	ND	5.0								
Atrazine	ND	1.0								
Benzaldehyde	ND	1.0								
Benzo(a)anthracene	ND	5.0								
Benzo(a)pyrene	ND	5.0								
Benzo(b)fluoranthene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benzo(k)fluoranthene	ND	5.0								
Bis(2-chloroethoxy)methane	ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ether	ND	5.0								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	5.0								
Caprolactam	ND	10								
Carbazole	ND	5.0								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

Chrysene	ND	5.0					
Dibenzo(a,h)anthracene	ND	5.0					
Dibenzofuran	ND	5.0					
Diethyl phthalate	ND	5.0					
Dimethyl phthalate	ND	5.0					
Di-n-butyl phthalate	ND	5.0					
Di-n-octyl phthalate	ND	5.0					
Fluoranthene	ND	5.0					
Fluorene	ND	5.0					
Hexachlorobenzene	ND	5.0					
Hexachlorobutadiene	ND	5.0					
Hexachlorocyclopentadiene	ND	5.0					
Hexachloroethane	ND	5.0					
Indeno(1,2,3-cd)pyrene	ND	5.0					
Isophorone	ND	5.0					
Naphthalene	ND	5.0					
Nitrobenzene	ND	5.0					
N-Nitrosodi-n-propylamine	ND	5.0					
N-Nitrosodiphenylamine	ND	5.0					
Pentachlorophenol	ND	5.0					
Phenanthrene	ND	5.0					
Phenol	ND	5.0					
Pyrene	ND	5.0					
Surr: 2,4,6-Tribromophenol	*34.59*	0	*50*	0	*69.2*	*27-83*	0
Surr: 2-Fluorobiphenyl	*36.13*	0	*50*	0	*72.3*	*26-79*	0
Surr: 2-Fluorophenol	*24.84*	0	*50*	0	*49.7*	*13-56*	0
Surr: 4-Terphenyl-d14	*43.12*	0	*50*	0	*86.2*	*43-106*	0
Surr: Nitrobenzene-d5	*35.35*	0	*50*	0	*70.7*	*29-80*	0
Surr: Phenol-d6	*17.35*	0	*50*	0	*34.7*	*10-35*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

LCS	Sample ID: **SLCSW1-196624-196624**				Units: **µg/L**		Analysis Date: **5/20/2022 04:15 PM**			
Client ID:	Run ID: **SVMS8_220520A**				SeqNo: **8444874**		Prep Date: **5/20/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1`-Biphenyl	14.05	5.0	20	0	70.2	40-85	0			
2,4,5-Trichlorophenol	14.72	5.0	20	0	73.6	47-84	0			
2,4,6-Trichlorophenol	14.77	5.0	20	0	73.8	45-83	0			
2,4-Dichlorophenol	14.3	5.0	20	0	71.5	39-84	0			
2,4-Dimethylphenol	13.88	5.0	20	0	69.4	34-79	0			
2,4-Dinitrophenol	11.64	5.0	20	0	58.2	11-117	0			
2,4-Dinitrotoluene	14.78	5.0	20	0	73.9	54-93	0			
2,6-Dinitrotoluene	15.05	5.0	20	0	75.2	51-90	0			
2-Chloronaphthalene	14.74	5.0	20	0	73.7	37-84	0			
2-Chlorophenol	14.12	5.0	20	0	70.6	38-83	0			
2-Methylnaphthalene	13.99	5.0	20	0	70	33-85	0			
2-Methylphenol	13.06	5.0	20	0	65.3	29-76	0			
2-Nitroaniline	15.25	5.0	20	0	76.2	45-94	0			
2-Nitrophenol	14.26	5.0	20	0	71.3	41-84	0			
3&4-Methylphenol	12.01	5.0	20	0	60	24-70	0			
3,3´-Dichlorobenzidine	14.34	5.0	20	0	71.7	39-96	0			
3-Nitroaniline	15.14	5.0	20	0	75.7	50-93	0			
4,6-Dinitro-2-methylphenol	14.31	5.0	20	0	71.6	23-116	0			
4-Bromophenyl phenyl ether	15.3	5.0	20	0	76.5	51-93	0			
4-Chloro-3-methylphenol	14.35	5.0	20	0	71.8	41-86	0			
4-Chloroaniline	14.69	5.0	20	0	73.4	44-92	0			
4-Chlorophenyl phenyl ether	14.48	5.0	20	0	72.4	49-89	0			
4-Nitroaniline	15.04	5.0	20	0	75.2	47-98	0			
4-Nitrophenol	7.85	5.0	20	0	39.2	10-43	0			
Acenaphthene	14.44	5.0	20	0	72.2	42-85	0			
Acenaphthylene	14.84	5.0	20	0	74.2	42-88	0			
Acetophenone	14.64	1.0	20	0	73.2	39-91	0			
Anthracene	15.15	5.0	20	0	75.8	55-93	0			
Atrazine	14.98	1.0	20	0	74.9	52-100	0			
Benzaldehyde	15.82	1.0	20	0	79.1	42-110	0			
Benzo(a)anthracene	15.9	5.0	20	0	79.5	56-91	0			
Benzo(a)pyrene	15.46	5.0	20	0	77.3	55-96	0			
Benzo(b)fluoranthene	15.82	5.0	20	0	79.1	55-99	0			
Benzo(g,h,i)perylene	15.29	5.0	20	0	76.4	44-102	0			
Benzo(k)fluoranthene	16.8	5.0	20	0	84	57-96	0			
Bis(2-chloroethoxy)methane	14.45	5.0	20	0	72.2	39-88	0			
Bis(2-chloroethyl)ether	14.43	5.0	20	0	72.2	36-91	0			
Bis(2-chloroisopropyl)ether	14.29	5.0	20	0	71.4	33-83	0			
Bis(2-ethylhexyl)phthalate	15.06	5.0	20	0	75.3	39-113	0			
Butyl benzyl phthalate	14.61	5.0	20	0	73	49-97	0			
Carbazole	15.15	5.0	20	0	75.8	59-92	0			
Chrysene	16.53	5.0	20	0	82.6	55-92	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

Dibenzo(a,h)anthracene	14.81	5.0	20	0	74	47-100	0
Dibenzofuran	14.74	5.0	20	0	73.7	44-89	0
Diethyl phthalate	14.41	5.0	20	0	72	54-95	0
Dimethyl phthalate	14.81	5.0	20	0	74	51-92	0
Di-n-butyl phthalate	14.87	5.0	20	0	74.4	57-98	0
Di-n-octyl phthalate	14.31	5.0	20	0	71.6	36-117	0
Fluoranthene	15.06	5.0	20	0	75.3	59-93	0
Fluorene	14.64	5.0	20	0	73.2	47-91	0
Hexachlorobenzene	14.8	5.0	20	0	74	53-89	0
Hexachlorobutadiene	12.9	5.0	20	0	64.5	11-83	0
Hexachlorocyclopentadiene	8.98	5.0	20	0	44.9	14-75	0
Hexachloroethane	12.78	5.0	20	0	63.9	10-85	0
Indeno(1,2,3-cd)pyrene	13.97	5.0	20	0	69.8	46-102	0
Isophorone	14.72	5.0	20	0	73.6	42-90	0
Naphthalene	13.83	5.0	20	0	69.2	26-78	0
Nitrobenzene	15.01	5.0	20	0	75	38-86	0
N-Nitrosodi-n-propylamine	14.82	5.0	20	0	74.1	39-95	0
N-Nitrosodiphenylamine	15.2	5.0	20	0	76	47-94	0
Pentachlorophenol	14.21	5.0	20	0	71	37-94	0
Phenanthrene	15.27	5.0	20	0	76.4	51-90	0
Phenol	7.26	5.0	20	0	36.3	10-40	0
Pyrene	16.7	5.0	20	0	83.5	48-98	0
Surr: 2,4,6-Tribromophenol	*37.87*	0	*50*	0	*75.7*	*27-83*	0
Surr: 2-Fluorobiphenyl	*36.45*	0	*50*	0	*72.9*	*26-79*	0
Surr: 2-Fluorophenol	*23.49*	0	*50*	0	*47*	*13-56*	0
Surr: 4-Terphenyl-d14	*42.21*	0	*50*	0	*84.4*	*43-106*	0
Surr: Nitrobenzene-d5	*36.13*	0	*50*	0	*72.3*	*29-80*	0
Surr: Phenol-d6	*15.56*	0	*50*	0	*31.1*	*10-35*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

LCSD	Sample ID: **SLCSDW1-196624-196624**				Units: **µg/L**			Analysis Date: **5/20/2022 04:35 PM**			
Client ID:		Run ID: **SVMS8_220520A**			SeqNo: **8444875**			Prep Date: **5/20/2022**		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1`-Biphenyl	11.55	5.0	20	0	57.8	40-85	14.05	19.5	30	
2,4,5-Trichlorophenol	12.55	5.0	20	0	62.8	47-84	14.72	15.9	30	
2,4,6-Trichlorophenol	12.04	5.0	20	0	60.2	45-83	14.77	20.4	30	
2,4-Dichlorophenol	11.36	5.0	20	0	56.8	39-84	14.3	22.9	30	
2,4-Dimethylphenol	11.63	5.0	20	0	58.2	34-79	13.88	17.6	30	
2,4-Dinitrophenol	7.65	5.0	20	0	38.2	11-117	11.64	41.4	30	R
2,4-Dinitrotoluene	13.3	5.0	20	0	66.5	54-93	14.78	10.5	30	
2,6-Dinitrotoluene	13.02	5.0	20	0	65.1	51-90	15.05	14.5	30	
2-Chloronaphthalene	11.74	5.0	20	0	58.7	37-84	14.74	22.7	30	
2-Chlorophenol	11.52	5.0	20	0	57.6	38-83	14.12	20.3	30	
2-Methylnaphthalene	11.17	5.0	20	0	55.8	33-85	13.99	22.4	30	
2-Methylphenol	11.38	5.0	20	0	56.9	29-76	13.06	13.7	30	
2-Nitroaniline	13.33	5.0	20	0	66.6	45-94	15.25	13.4	30	
2-Nitrophenol	10.9	5.0	20	0	54.5	41-84	14.26	26.7	30	
3&4-Methylphenol	10.45	5.0	20	0	52.2	24-70	12.01	13.9	30	
3,3´-Dichlorobenzidine	12.51	5.0	20	0	62.6	39-96	14.34	13.6	30	
3-Nitroaniline	14.27	5.0	20	0	71.4	50-93	15.14	5.92	30	
4,6-Dinitro-2-methylphenol	11.28	5.0	20	0	56.4	23-116	14.31	23.7	30	
4-Bromophenyl phenyl ether	13.39	5.0	20	0	67	51-93	15.3	13.3	30	
4-Chloro-3-methylphenol	12.37	5.0	20	0	61.8	41-86	14.35	14.8	30	
4-Chloroaniline	12.49	5.0	20	0	62.4	44-92	14.69	16.2	30	
4-Chlorophenyl phenyl ether	12.4	5.0	20	0	62	49-89	14.48	15.5	30	
4-Nitroaniline	13.44	5.0	20	0	67.2	47-98	15.04	11.2	30	
4-Nitrophenol	6.84	5.0	20	0	34.2	10-43	7.85	13.8	30	
Acenaphthene	11.96	5.0	20	0	59.8	42-85	14.44	18.8	30	
Acenaphthylene	12.35	5.0	20	0	61.8	42-88	14.84	18.3	30	
Acetophenone	11.91	1.0	20	0	59.6	39-91	14.64	20.6	30	
Anthracene	13.4	5.0	20	0	67	55-93	15.15	12.3	30	
Atrazine	13.43	1.0	20	0	67.2	52-100	14.98	10.9	30	
Benzaldehyde	12.57	1.0	20	0	62.8	42-110	15.82	22.9	30	
Benzo(a)anthracene	14.08	5.0	20	0	70.4	56-91	15.9	12.1	30	
Benzo(a)pyrene	13.46	5.0	20	0	67.3	55-96	15.46	13.8	30	
Benzo(b)fluoranthene	14.46	5.0	20	0	72.3	55-99	15.82	8.98	30	
Benzo(g,h,i)perylene	12.99	5.0	20	0	65	44-102	15.29	16.3	30	
Benzo(k)fluoranthene	14.4	5.0	20	0	72	57-96	16.8	15.4	30	
Bis(2-chloroethoxy)methane	11.71	5.0	20	0	58.6	39-88	14.45	20.9	30	
Bis(2-chloroethyl)ether	11.53	5.0	20	0	57.6	36-91	14.43	22.3	30	
Bis(2-chloroisopropyl)ether	11.39	5.0	20	0	57	33-83	14.29	22.6	30	
Bis(2-ethylhexyl)phthalate	13.33	5.0	20	0	66.6	39-113	15.06	12.2	30	
Butyl benzyl phthalate	13.17	5.0	20	0	65.8	49-97	14.61	10.4	30	
Carbazole	13.54	5.0	20	0	67.7	59-92	15.15	11.2	30	
Chrysene	14.3	5.0	20	0	71.5	55-92	16.53	14.5	30	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **196624** Instrument ID **SVMS8** Method: **SW846 8270D**

Dibenzo(a,h)anthracene	12.56	5.0	20	0	62.8	47-100	14.81	16.4	30
Dibenzofuran	12.4	5.0	20	0	62	44-89	14.74	17.2	30
Diethyl phthalate	12.96	5.0	20	0	64.8	54-95	14.41	10.6	30
Dimethyl phthalate	12.87	5.0	20	0	64.4	51-92	14.81	14	30
Di-n-butyl phthalate	13.05	5.0	20	0	65.2	57-98	14.87	13	30
Di-n-octyl phthalate	12.64	5.0	20	0	63.2	36-117	14.31	12.4	30
Fluoranthene	13.29	5.0	20	0	66.4	59-93	15.06	12.5	30
Fluorene	12.45	5.0	20	0	62.2	47-91	14.64	16.2	30
Hexachlorobenzene	13.21	5.0	20	0	66	53-89	14.8	11.4	30
Hexachlorobutadiene	10.6	5.0	20	0	53	11-83	12.9	19.6	30
Hexachlorocyclopentadiene	7.62	5.0	20	0	38.1	14-75	8.98	16.4	30
Hexachloroethane	10.66	5.0	20	0	53.3	10-85	12.78	18.1	30
Indeno(1,2,3-cd)pyrene	11.91	5.0	20	0	59.6	46-102	13.97	15.9	30
Isophorone	12.2	5.0	20	0	61	42-90	14.72	18.7	30
Naphthalene	11.07	5.0	20	0	55.4	26-78	13.83	22.2	30
Nitrobenzene	12	5.0	20	0	60	38-86	15.01	22.3	30
N-Nitrosodi-n-propylamine	11.94	5.0	20	0	59.7	39-95	14.82	21.5	30
N-Nitrosodiphenylamine	13.36	5.0	20	0	66.8	47-94	15.2	12.9	30
Pentachlorophenol	12.5	5.0	20	0	62.5	37-94	14.21	12.8	30
Phenanthrene	13.62	5.0	20	0	68.1	51-90	15.27	11.4	30
Phenol	6.32	5.0	20	0	31.6	10-40	7.26	13.8	30
Pyrene	15.07	5.0	20	0	75.4	48-98	16.7	10.3	30
Surr: 2,4,6-Tribromophenol	*32.26*	0	*50*	0	*64.5*	*27-83*	37.87	*16*	*40*
Surr: 2-Fluorobiphenyl	*28.54*	0	*50*	0	*57.1*	*26-79*	36.45	*24.3*	*40*
Surr: 2-Fluorophenol	*20.12*	0	*50*	0	*40.2*	*13-56*	23.49	*15.5*	*40*
Surr: 4-Terphenyl-d14	*38.32*	0	*50*	0	*76.6*	*43-106*	42.21	*9.66*	*40*
Surr: Nitrobenzene-d5	*28.61*	0	*50*	0	*57.2*	*29-80*	36.13	*23.2*	*40*
Surr: Phenol-d6	*14.12*	0	*50*	0	*28.2*	*10-35*	15.56	*9.7*	*40*

The following samples were analyzed in this batch:

22051511-01C	22051511-02C	22051511-03C
22051511-04C	22051511-05C	22051511-06C
22051511-07C	22051511-08C	22051511-09C
22051511-10C	22051511-11C	22051511-12C
22051511-14C	22051511-16C	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

MBLK	Sample ID: **8V-BLKW2-220519-R344771a**				Units: **µg/L**		Analysis Date: **5/19/2022 11:11 PM**			
Client ID:		Run ID: **VMS8_220519B**			SeqNo: **8439351**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
1,1,2-Trichlorotrifluoroethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	1.0								
1,2-Dibromoethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,2-Dichloroethane	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
2-Butanone	ND	5.0								
2-Hexanone	ND	5.0								
4-Methyl-2-pentanone	ND	1.0								
Acetone	ND	10								
Benzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	1.0								
Carbon disulfide	ND	1.0								
Carbon tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	1.0								
Chloroform	ND	1.0								
Chloromethane	ND	1.0								
cis-1,2-Dichloroethene	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
Cyclohexane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
Ethylbenzene	ND	1.0								
Isopropylbenzene	ND	1.0								
Methyl acetate	ND	2.0								
Methyl tert-butyl ether	ND	1.0								
Methylcyclohexane	ND	1.0								
Methylene chloride	ND	5.0								
Styrene	ND	1.0								
Tetrachloroethene	ND	1.0								
Toluene	ND	1.0								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

trans-1,2-Dichloroethene	ND	1.0					
trans-1,3-Dichloropropene	ND	1.0					
Trichloroethene	ND	1.0					
Trichlorofluoromethane	ND	1.0					
Vinyl chloride	ND	1.0					
Xylenes, Total	ND	3.0					
Surr: 1,2-Dichloroethane-d4	*19.56*	0	*20*	0	*97.8*	*75-120*	0
Surr: 4-Bromofluorobenzene	*18.58*	0	*20*	0	*92.9*	*80-110*	0
Surr: Dibromofluoromethane	*20.29*	0	*20*	0	*101*	*85-115*	0
Surr: Toluene-d8	*20.95*	0	*20*	0	*105*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

LCS	Sample ID: **8V-LCSW2-220519-R344771a**				Units: **µg/L**			Analysis Date: **5/19/2022 10:15 PM**			
Client ID:		Run ID: **VMS8_220519B**			SeqNo: **8439349**			Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.39	1.0	20	0	102	75-130	0			
1,1,2,2-Tetrachloroethane	22.92	1.0	20	0	115	75-130	0			
1,1,2-Trichloroethane	20.76	1.0	20	0	104	75-125	0			
1,1,2-Trichlorotrifluoroethane	20.9	1.0	20	0	104	50-150	0			
1,1-Dichloroethane	19.55	1.0	20	0	97.8	68-142	0			
1,1-Dichloroethene	20.24	1.0	20	0	101	70-145	0			
1,2,4-Trichlorobenzene	20.69	1.0	20	0	103	70-135	0			
1,2-Dibromo-3-chloropropane	22.84	1.0	20	0	114	60-130	0			
1,2-Dibromoethane	21.99	1.0	20	0	110	67-155	0			
1,2-Dichlorobenzene	20.84	1.0	20	0	104	70-130	0			
1,2-Dichloroethane	19.66	1.0	20	0	98.3	78-125	0			
1,2-Dichloropropane	19.17	1.0	20	0	95.8	75-125	0			
1,3-Dichlorobenzene	20.15	1.0	20	0	101	75-130	0			
1,4-Dichlorobenzene	19.93	1.0	20	0	99.6	75-130	0			
2-Butanone	23.81	5.0	20	0	119	55-150	0			
2-Hexanone	24.62	5.0	20	0	123	60-135	0			
4-Methyl-2-pentanone	32.06	1.0	20	0	160	77-178	0			
Acetone	23.16	10	20	0	116	60-160	0			
Benzene	19.64	1.0	20	0	98.2	70-130	0			
Bromodichloromethane	19.08	1.0	20	0	95.4	75-125	0			
Bromoform	18.04	1.0	20	0	90.2	60-125	0			
Bromomethane	20.42	1.0	20	0	102	30-185	0			
Carbon disulfide	21.36	1.0	20	0	107	60-165	0			
Carbon tetrachloride	19.03	1.0	20	0	95.2	65-140	0			
Chlorobenzene	20.87	1.0	20	0	104	80-120	0			
Chloroethane	14.58	1.0	20	0	72.9	31-172	0			
Chloroform	19.48	1.0	20	0	97.4	66-135	0			
Chloromethane	14.92	1.0	20	0	74.6	46-148	0			
cis-1,2-Dichloroethene	19.9	1.0	20	0	99.5	75-134	0			
cis-1,3-Dichloropropene	17.34	1.0	20	0	86.7	70-130	0			
Cyclohexane	19.97	2.0	20	0	99.8	50-150	0			
Dibromochloromethane	19.26	1.0	20	0	96.3	60-115	0			
Dichlorodifluoromethane	20.55	1.0	20	0	103	10-180	0			
Ethylbenzene	20.85	1.0	20	0	104	76-123	0			
Isopropylbenzene	21.3	1.0	20	0	106	80-127	0			
Methyl tert-butyl ether	22.28	1.0	20	0	111	68-129	0			
Methylcyclohexane	20.35	1.0	20	0	102	50-150	0			
Methylene chloride	20.24	5.0	20	0	101	72-125	0			
Styrene	21.55	1.0	20	0	108	79-117	0			
Tetrachloroethene	20.08	1.0	20	0	100	68-166	0			
Toluene	19.66	1.0	20	0	98.3	76-125	0			
trans-1,2-Dichloroethene	21.4	1.0	20	0	107	80-140	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

trans-1,3-Dichloropropene	17.52	1.0	20	0	87.6	56-132	0
Trichloroethene	18.47	1.0	20	0	92.4	77-125	0
Trichlorofluoromethane	17.56	1.0	20	0	87.8	60-140	0
Vinyl chloride	19.92	1.0	20	0	99.6	50-136	0
Xylenes, Total	64.29	3.0	60	0	107	76-127	0
Surr: 1,2-Dichloroethane-d4	*20.15*	0	*20*	0	*101*	*75-120*	0
Surr: 4-Bromofluorobenzene	*20.46*	0	*20*	0	*102*	*80-110*	0
Surr: Dibromofluoromethane	*20.28*	0	*20*	0	*101*	*85-115*	0
Surr: Toluene-d8	*19.1*	0	*20*	0	*95.5*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

MS	Sample ID: **22051511-01A MS**				Units: **µg/L**			Analysis Date: **5/20/2022 06:51 AM**		
Client ID: **MW-101**	Run ID: **VMS8_220519B**				SeqNo: **8439376**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.84	1.0	20	0	104	75-130	0			
1,1,2,2-Tetrachloroethane	21.69	1.0	20	0	108	75-130	0			
1,1,2-Trichloroethane	21.48	1.0	20	0	107	75-125	0			
1,1,2-Trichlorotrifluoroethane	19.37	1.0	20	0	96.8	50-150	0			
1,1-Dichloroethane	20.02	1.0	20	0	100	68-142	0			
1,1-Dichloroethene	19.78	1.0	20	0	98.9	70-145	0			
1,2,4-Trichlorobenzene	18.93	1.0	20	0	94.6	70-135	0			
1,2-Dibromo-3-chloropropane	20.49	1.0	20	0	102	60-130	0			
1,2-Dibromoethane	22.31	1.0	20	0	112	67-155	0			
1,2-Dichlorobenzene	20.26	1.0	20	0	101	70-130	0			
1,2-Dichloroethane	20.05	1.0	20	0	100	78-125	0			
1,2-Dichloropropane	19.11	1.0	20	0	95.6	75-125	0			
1,3-Dichlorobenzene	18.68	1.0	20	0	93.4	75-130	0			
1,4-Dichlorobenzene	19.02	1.0	20	0	95.1	75-130	0			
2-Butanone	24.15	5.0	20	0	121	55-150	0			
2-Hexanone	22.98	5.0	20	0	115	60-135	0			
4-Methyl-2-pentanone	32.74	1.0	20	0	164	77-178	0			
Acetone	25.83	10	20	1.76	120	60-160	0			
Benzene	19.33	1.0	20	0	96.6	70-130	0			
Bromodichloromethane	18.89	1.0	20	0	94.4	75-125	0			
Bromoform	17.14	1.0	20	0	85.7	60-125	0			
Bromomethane	29.53	1.0	20	0	148	30-185	0			
Carbon disulfide	20.82	1.0	20	0	104	60-165	0			
Carbon tetrachloride	19.08	1.0	20	0	95.4	65-140	0			
Chlorobenzene	19.62	1.0	20	0	98.1	80-120	0			
Chloroethane	22.89	1.0	20	0	114	31-172	0			
Chloroform	19.97	1.0	20	0	99.8	66-135	0			
Chloromethane	13.97	1.0	20	0	69.8	46-148	0			
cis-1,2-Dichloroethene	19.37	1.0	20	0	96.8	75-134	0			
cis-1,3-Dichloropropene	15.21	1.0	20	0	76	70-130	0			
Cyclohexane	20.09	2.0	20	0	100	50-150	0			
Dibromochloromethane	18.89	1.0	20	0	94.4	60-115	0			
Dichlorodifluoromethane	20.09	1.0	20	0	100	10-180	0			
Ethylbenzene	20.1	1.0	20	0	100	76-123	0			
Isopropylbenzene	20.6	1.0	20	0	103	80-127	0			
Methyl tert-butyl ether	21.98	1.0	20	0	110	68-129	0			
Methylcyclohexane	18.76	1.0	20	0	93.8	50-150	0			
Methylene chloride	19.87	5.0	20	0	99.4	72-125	0			
Styrene	20.14	1.0	20	0	101	79-117	0			
Tetrachloroethene	21.39	1.0	20	0	107	68-166	0			
Toluene	19.58	1.0	20	0	97.9	76-125	0			
trans-1,2-Dichloroethene	21.43	1.0	20	0	107	80-140	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

trans-1,3-Dichloropropene	15.33	1.0	20	0	76.6	56-132	0
Trichloroethene	18.53	1.0	20	0	92.6	77-125	0
Trichlorofluoromethane	18.29	1.0	20	0	91.4	60-140	0
Vinyl chloride	21.87	1.0	20	0	109	50-136	0
Xylenes, Total	61.63	3.0	60	0	103	76-127	0
Surr: 1,2-Dichloroethane-d4	*20.45*	0	*20*	0	*102*	*75-120*	0
Surr: 4-Bromofluorobenzene	*19.81*	0	*20*	0	*99*	*80-110*	0
Surr: Dibromofluoromethane	*20.46*	0	*20*	0	*102*	*85-115*	0
Surr: Toluene-d8	*20.03*	0	*20*	0	*100*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

DUP Sample ID: **22051511-02A DUP** Units: **µg/L** Analysis Date: **5/20/2022 06:32 AM**

Client ID: **MW-102** Run ID: **VMS8_220519B** SeqNo: **8439375** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	ND	1.0	0	0	0		0	0	30	
1,1,2,2-Tetrachloroethane	ND	1.0	0	0	0		0	0	30	
1,1,2-Trichloroethane	ND	1.0	0	0	0		0	0	30	
1,1,2-Trichlorotrifluoroethane	ND	1.0	0	0	0		0	0	30	
1,1-Dichloroethane	ND	1.0	0	0	0		0	0	30	
1,1-Dichloroethene	ND	1.0	0	0	0		0	0	30	
1,2,4-Trichlorobenzene	ND	1.0	0	0	0		0	0	30	
1,2-Dibromo-3-chloropropane	ND	1.0	0	0	0		0	0	30	
1,2-Dibromoethane	ND	1.0	0	0	0		0	0	30	
1,2-Dichlorobenzene	ND	1.0	0	0	0		0	0	30	
1,2-Dichloroethane	ND	1.0	0	0	0		0	0	30	
1,2-Dichloropropane	ND	1.0	0	0	0		0	0	30	
1,3-Dichlorobenzene	ND	1.0	0	0	0		0	0	30	
1,4-Dichlorobenzene	ND	1.0	0	0	0		0	0	30	
2-Butanone	ND	5.0	0	0	0		0	0	30	
2-Hexanone	ND	5.0	0	0	0		0	0	30	
4-Methyl-2-pentanone	ND	1.0	0	0	0		0	0	30	
Acetone	ND	10	0	0	0		1.29	0	30	
Benzene	ND	1.0	0	0	0		0	0	30	
Bromodichloromethane	ND	1.0	0	0	0		0	0	30	
Bromoform	ND	1.0	0	0	0		0	0	30	
Bromomethane	ND	1.0	0	0	0		0	0	30	
Carbon disulfide	ND	1.0	0	0	0		0	0	30	
Carbon tetrachloride	ND	1.0	0	0	0		0	0	30	
Chlorobenzene	0.79	1.0	0	0	0		0.63	0	30	J
Chloroethane	ND	1.0	0	0	0		0	0	30	
Chloroform	ND	1.0	0	0	0		0	0	30	
Chloromethane	ND	1.0	0	0	0		0	0	30	
cis-1,2-Dichloroethene	ND	1.0	0	0	0		0	0	30	
cis-1,3-Dichloropropene	ND	1.0	0	0	0		0	0	30	
Cyclohexane	ND	2.0	0	0	0		0	0	30	
Dibromochloromethane	ND	1.0	0	0	0		0	0	30	
Dichlorodifluoromethane	ND	1.0	0	0	0		0	0	30	
Ethylbenzene	ND	1.0	0	0	0		0	0	30	
Isopropylbenzene	ND	1.0	0	0	0		0	0	30	
Methyl acetate	ND	2.0	0	0	0		0	0	30	
Methyl tert-butyl ether	ND	1.0	0	0	0		0	0	30	
Methylcyclohexane	ND	1.0	0	0	0		0	0	30	
Methylene chloride	ND	5.0	0	0	0		0	0	30	
Styrene	ND	1.0	0	0	0		0	0	30	
Tetrachloroethene	ND	1.0	0	0	0		0	0	30	
Toluene	ND	1.0	0	0	0		0	0	30	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344771a** Instrument ID **VMS8** Method: **SW8260C**

trans-1,2-Dichloroethene	ND	1.0	0	0	0		0	0	30
trans-1,3-Dichloropropene	ND	1.0	0	0	0		0	0	30
Trichloroethene	ND	1.0	0	0	0		0	0	30
Trichlorofluoromethane	ND	1.0	0	0	0		0	0	30
Vinyl chloride	ND	1.0	0	0	0		0	0	30
Xylenes, Total	ND	3.0	0	0	0		0	0	30
Surr: 1,2-Dichloroethane-d4	*19.48*	0	*20*	0	*97.4*	*75-120*	21.21	*8.5*	*30*
Surr: 4-Bromofluorobenzene	*18.1*	0	*20*	0	*90.5*	*80-110*	19.11	*5.43*	*30*
Surr: Dibromofluoromethane	*20.15*	0	*20*	0	*101*	*85-115*	20.27	*0.594*	*30*
Surr: Toluene-d8	*19.52*	0	*20*	0	*97.6*	*85-110*	20.6	*5.38*	*30*

The following samples were analyzed in this batch:

22051511-01A	22051511-02A	22051511-03A
22051511-04A	22051511-05A	22051511-06A
22051511-07A	22051511-08A	22051511-09A
22051511-10A	22051511-11A	22051511-12A
22051511-14A	22051511-15A	22051511-16A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

MBLK	Sample ID: **10V-BLKW1-220520-R344778a**			Units: **µg/L**		Analysis Date: **5/20/2022 12:09 PM**			
Client ID:	Run ID: **VMS10_220520A**			SeqNo: **8440296**		Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
1,1,2-Trichlorotrifluoroethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	1.0								
1,2-Dibromoethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,2-Dichloroethane	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
2-Butanone	ND	5.0								
2-Hexanone	ND	5.0								
4-Methyl-2-pentanone	ND	1.0								
Acetone	ND	10								
Benzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	1.0								
Carbon disulfide	ND	1.0								
Carbon tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	1.0								
Chloroform	ND	1.0								
Chloromethane	ND	1.0								
cis-1,2-Dichloroethene	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
Cyclohexane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
Ethylbenzene	ND	1.0								
Isopropylbenzene	ND	1.0								
Methyl acetate	ND	2.0								
Methyl tert-butyl ether	ND	1.0								
Methylcyclohexane	ND	1.0								
Methylene chloride	ND	5.0								
Styrene	ND	1.0								
Tetrachloroethene	ND	1.0								
Toluene	ND	1.0								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

trans-1,2-Dichloroethene	ND	1.0					
trans-1,3-Dichloropropene	ND	1.0					
Trichloroethene	ND	1.0					
Trichlorofluoromethane	ND	1.0					
Vinyl chloride	ND	1.0					
Xylenes, Total	ND	3.0					
Surr: 1,2-Dichloroethane-d4	*21.1*	0	*20*	0	*106*	*75-120*	0
Surr: 4-Bromofluorobenzene	*18.91*	0	*20*	0	*94.6*	*80-110*	0
Surr: Dibromofluoromethane	*19.7*	0	*20*	0	*98.5*	*85-115*	0
Surr: Toluene-d8	*20.06*	0	*20*	0	*100*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

LCS	Sample ID: **10V-LCSW1-220520-R344778a**				Units: **µg/L**			Analysis Date: **5/20/2022 12:26 PM**			
Client ID:		Run ID: **VMS10_220520A**			SeqNo: **8440297**			Prep Date:		DF: **1**	
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	20.9	1.0	20	0	104	75-130	0			
1,1,2,2-Tetrachloroethane	24.93	1.0	20	0	125	75-130	0			
1,1,2-Trichloroethane	21.44	1.0	20	0	107	75-125	0			
1,1,2-Trichlorotrifluoroethane	21.92	1.0	20	0	110	50-150	0			
1,1-Dichloroethane	22.83	1.0	20	0	114	68-142	0			
1,1-Dichloroethene	24.22	1.0	20	0	121	70-145	0			
1,2,4-Trichlorobenzene	21.16	1.0	20	0	106	70-135	0			
1,2-Dibromo-3-chloropropane	20.31	1.0	20	0	102	60-130	0			
1,2-Dibromoethane	23.58	1.0	20	0	118	67-155	0			
1,2-Dichlorobenzene	21.57	1.0	20	0	108	70-130	0			
1,2-Dichloroethane	22.96	1.0	20	0	115	78-125	0			
1,2-Dichloropropane	21.43	1.0	20	0	107	75-125	0			
1,3-Dichlorobenzene	21.77	1.0	20	0	109	75-130	0			
1,4-Dichlorobenzene	21.76	1.0	20	0	109	75-130	0			
2-Butanone	23.95	5.0	20	0	120	55-150	0			
2-Hexanone	24.39	5.0	20	0	122	60-135	0			
4-Methyl-2-pentanone	31.87	1.0	20	0	159	77-178	0			
Acetone	30.15	10	20	0	151	60-160	0			
Benzene	22.07	1.0	20	0	110	70-130	0			
Bromodichloromethane	20.87	1.0	20	0	104	75-125	0			
Bromoform	18.43	1.0	20	0	92.2	60-125	0			
Bromomethane	23.71	1.0	20	0	119	30-185	0			
Carbon disulfide	22.17	1.0	20	0	111	60-165	0			
Carbon tetrachloride	19.75	1.0	20	0	98.8	65-140	0			
Chlorobenzene	21.34	1.0	20	0	107	80-120	0			
Chloroethane	21.18	1.0	20	0	106	31-172	0			
Chloroform	22.16	1.0	20	0	111	66-135	0			
Chloromethane	14.85	1.0	20	0	74.2	46-148	0			
cis-1,2-Dichloroethene	22.56	1.0	20	0	113	75-134	0			
cis-1,3-Dichloropropene	21.96	1.0	20	0	110	70-130	0			
Cyclohexane	20.08	2.0	20	0	100	50-150	0			
Dibromochloromethane	18.93	1.0	20	0	94.6	60-115	0			
Dichlorodifluoromethane	19.32	1.0	20	0	96.6	10-180	0			
Ethylbenzene	21.21	1.0	20	0	106	76-123	0			
Isopropylbenzene	21.72	1.0	20	0	109	80-127	0			
Methyl tert-butyl ether	23.26	1.0	20	0	116	68-129	0			
Methylcyclohexane	19.52	1.0	20	0	97.6	50-150	0			
Methylene chloride	22.02	5.0	20	0	110	72-125	0			
Styrene	21.22	1.0	20	0	106	79-117	0			
Tetrachloroethene	21.38	1.0	20	0	107	68-166	0			
Toluene	21.24	1.0	20	0	106	76-125	0			
trans-1,2-Dichloroethene	22.87	1.0	20	0	114	80-140	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

trans-1,3-Dichloropropene	17.91	1.0	20	0	89.6	56-132	0
Trichloroethene	20.47	1.0	20	0	102	77-125	0
Trichlorofluoromethane	19.68	1.0	20	0	98.4	60-140	0
Vinyl chloride	19.51	1.0	20	0	97.6	50-136	0
Xylenes, Total	64.75	3.0	60	0	108	76-127	0
Surr: 1,2-Dichloroethane-d4	*21.03*	0	*20*	0	*105*	*75-120*	0
Surr: 4-Bromofluorobenzene	*19.66*	0	*20*	0	*98.3*	*80-110*	0
Surr: Dibromofluoromethane	*20.67*	0	*20*	0	*103*	*85-115*	0
Surr: Toluene-d8	*19.95*	0	*20*	0	*99.8*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

MS Sample ID: **22051315-04A MS** Units: **µg/L** Analysis Date: **5/20/2022 06:53 PM**

Client ID: Run ID: **VMS10_220520A** SeqNo: **8442341** Prep Date: DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	216.2	10	200	0	108	75-130	0			
1,1,2,2-Tetrachloroethane	225.3	10	200	0	113	75-130	0			
1,1,2-Trichloroethane	202.8	10	200	0	101	75-125	0			
1,1,2-Trichlorotrifluoroethane	247.8	10	200	0	124	50-150	0			
1,1-Dichloroethane	219.8	10	200	0	110	68-142	0			
1,1-Dichloroethene	259.7	10	200	0	130	70-145	0			
1,2,4-Trichlorobenzene	187.2	10	200	0	93.6	70-135	0			
1,2-Dibromo-3-chloropropane	191.6	10	200	0	95.8	60-130	0			
1,2-Dibromoethane	218.7	10	200	0	109	67-155	0			
1,2-Dichlorobenzene	198	10	200	0	99	70-130	0			
1,2-Dichloroethane	211.1	10	200	0	106	78-125	0			
1,2-Dichloropropane	200.2	10	200	0	100	75-125	0			
1,3-Dichlorobenzene	204.8	10	200	0	102	75-130	0			
1,4-Dichlorobenzene	202.3	10	200	0	101	75-130	0			
2-Butanone	225.6	50	200	0	113	55-150	0			
2-Hexanone	229.2	50	200	0	115	60-135	0			
4-Methyl-2-pentanone	302.4	10	200	0	151	77-178	0			
Acetone	285.8	100	200	32.9	126	60-160	0			
Benzene	211.5	10	200	0	106	70-130	0			
Bromodichloromethane	198.2	10	200	0	99.1	75-125	0			
Bromoform	185.4	10	200	0	92.7	60-125	0			
Bromomethane	429.2	10	200	0	215	30-185	0			S
Carbon disulfide	238.3	10	200	0	119	60-165	0			
Carbon tetrachloride	206.5	10	200	0	103	65-140	0			
Chlorobenzene	206.5	10	200	0	103	80-120	0			
Chloroethane	254.7	10	200	0	127	31-172	0			
Chloroform	208.3	10	200	0	104	66-135	0			
Chloromethane	287.4	10	200	6.3	141	46-148	0			
cis-1,2-Dichloroethene	222.5	10	200	0	111	75-134	0			
cis-1,3-Dichloropropene	209.8	10	200	0	105	70-130	0			
Cyclohexane	218	20	200	0	109	50-150	0			
Dibromochloromethane	185	10	200	0	92.5	60-115	0			
Dichlorodifluoromethane	225.9	10	200	0	113	10-180	0			
Ethylbenzene	211.4	10	200	1.4	105	76-123	0			
Isopropylbenzene	216.3	10	200	0	108	80-127	0			
Methyl tert-butyl ether	222.4	10	200	0	111	68-129	0			
Methylcyclohexane	208.4	10	200	0	104	50-150	0			
Methylene chloride	213.7	50	200	0	107	72-125	0			
Styrene	202.3	10	200	0	101	79-117	0			
Tetrachloroethene	221.9	10	200	0	111	68-166	0			
Toluene	207.7	10	200	0	104	76-125	0			
trans-1,2-Dichloroethene	219.7	10	200	0	110	80-140	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

trans-1,3-Dichloropropene	173.5	10	200	0	86.8	56-132	0
Trichloroethene	199.9	10	200	0	100	77-125	0
Trichlorofluoromethane	225.8	10	200	0	113	60-140	0
Vinyl chloride	235.1	10	200	0	118	50-136	0
Xylenes, Total	641.8	30	600	0	107	76-127	0
Surr: 1,2-Dichloroethane-d4	*203.5*	0	*200*	0	*102*	*75-120*	0
Surr: 4-Bromofluorobenzene	*203.6*	0	*200*	0	*102*	*80-110*	0
Surr: Dibromofluoromethane	*199.4*	0	*200*	0	*99.7*	*85-115*	0
Surr: Toluene-d8	*203.1*	0	*200*	0	*102*	*85-110*	0

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: The Mannik & Smith Group, Inc.
Work Order: 22051511
Project: Former Mount Pleasant Landfill

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

MSD	Sample ID: **22051315-04A MSD**				Units: **µg/L**			Analysis Date: **5/20/2022 07:10 PM**			
Client ID:		Run ID: **VMS10_220520A**			SeqNo: **8442342**		Prep Date:		DF: **10**		
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
1,1,1-Trichloroethane	204.8	10	200	0	102	75-130	216.2	5.42	30	
1,1,2,2-Tetrachloroethane	218.9	10	200	0	109	75-130	225.3	2.88	30	
1,1,2-Trichloroethane	191.6	10	200	0	95.8	75-125	202.8	5.68	30	
1,1,2-Trichlorotrifluoroethane	226.7	10	200	0	113	50-150	247.8	8.89	30	
1,1-Dichloroethane	207.5	10	200	0	104	68-142	219.8	5.76	30	
1,1-Dichloroethene	242.3	10	200	0	121	70-145	259.7	6.93	30	
1,2,4-Trichlorobenzene	183.5	10	200	0	91.8	70-135	187.2	2	30	
1,2-Dibromo-3-chloropropane	183.9	10	200	0	92	60-130	191.6	4.1	30	
1,2-Dibromoethane	207.9	10	200	0	104	67-155	218.7	5.06	30	
1,2-Dichlorobenzene	194.7	10	200	0	97.4	70-130	198	1.68	30	
1,2-Dichloroethane	201.9	10	200	0	101	78-125	211.1	4.46	30	
1,2-Dichloropropane	189.1	10	200	0	94.6	75-125	200.2	5.7	30	
1,3-Dichlorobenzene	198.1	10	200	0	99	75-130	204.8	3.33	30	
1,4-Dichlorobenzene	192.8	10	200	0	96.4	75-130	202.3	4.81	30	
2-Butanone	215.5	50	200	0	108	55-150	225.6	4.58	30	
2-Hexanone	218.2	50	200	0	109	60-135	229.2	4.92	30	
4-Methyl-2-pentanone	291.4	10	200	0	146	77-178	302.4	3.7	30	
Acetone	278.5	100	200	32.9	123	60-160	285.8	2.59	30	
Benzene	201.7	10	200	0	101	70-130	211.5	4.74	30	
Bromodichloromethane	191.7	10	200	0	95.8	75-125	198.2	3.33	30	
Bromoform	174.2	10	200	0	87.1	60-125	185.4	6.23	30	
Bromomethane	483.3	10	200	0	242	30-185	429.2	11.9	30	S
Carbon disulfide	275	10	200	0	138	60-165	238.3	14.3	30	
Carbon tetrachloride	204.4	10	200	0	102	65-140	206.5	1.02	30	
Chlorobenzene	193.4	10	200	0	96.7	80-120	206.5	6.55	30	
Chloroethane	241.2	10	200	0	121	31-172	254.7	5.44	30	
Chloroform	197.8	10	200	0	98.9	66-135	208.3	5.17	30	
Chloromethane	278.1	10	200	6.3	136	46-148	287.4	3.29	30	
cis-1,2-Dichloroethene	210.7	10	200	0	105	75-134	222.5	5.45	30	
cis-1,3-Dichloropropene	199.6	10	200	0	99.8	70-130	209.8	4.98	30	
Cyclohexane	209.4	20	200	0	105	50-150	218	4.02	30	
Dibromochloromethane	185.4	10	200	0	92.7	60-115	185	0.216	30	
Dichlorodifluoromethane	216.2	10	200	0	108	10-180	225.9	4.39	30	
Ethylbenzene	197.3	10	200	1.4	98	76-123	211.4	6.9	30	
Isopropylbenzene	203.1	10	200	0	102	80-127	216.3	6.29	30	
Methyl tert-butyl ether	210.4	10	200	0	105	68-129	222.4	5.55	30	
Methylcyclohexane	200.5	10	200	0	100	50-150	208.4	3.86	30	
Methylene chloride	203.1	50	200	0	102	72-125	213.7	5.09	30	
Styrene	190.5	10	200	0	95.2	79-117	202.3	6.01	30	
Tetrachloroethene	206.5	10	200	0	103	68-166	221.9	7.19	30	
Toluene	196	10	200	0	98	76-125	207.7	5.8	30	
trans-1,2-Dichloroethene	209.4	10	200	0	105	80-140	219.7	4.8	30	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

QC BATCH REPORT

Batch ID: **R344778a** Instrument ID **VMS10** Method: **SW8260C**

trans-1,3-Dichloropropene	167.3	10	200	0	83.6	56-132	173.5	3.64	30
Trichloroethene	186.8	10	200	0	93.4	77-125	199.9	6.78	30
Trichlorofluoromethane	207.4	10	200	0	104	60-140	225.8	8.49	30
Vinyl chloride	213.8	10	200	0	107	50-136	235.1	9.49	30
Xylenes, Total	598.9	30	600	0	99.8	76-127	641.8	6.92	30
Surr: 1,2-Dichloroethane-d4	*201.3*	0	*200*	0	*101*	*75-120*	203.5	*1.09*	*30*
Surr: 4-Bromofluorobenzene	*197.3*	0	*200*	0	*98.6*	*80-110*	203.6	*3.14*	*30*
Surr: Dibromofluoromethane	*196.9*	0	*200*	0	*98.4*	*85-115*	199.4	*1.26*	*30*
Surr: Toluene-d8	*198.2*	0	*200*	0	*99.1*	*85-110*	203.1	*2.44*	*30*

The following samples were analyzed in this batch: 22051511-08A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Cincinnati, OH | Fort Collins, CO 970 490 1511 | land, MI 616 399 6070

Chain of Custody Form

Houston, TX +1 281 530 5656 | Spring City, PA +1 610 948 4903 | South Charleston, WV +1 304 356 3168
Middletown, PA +1 717 944 5541 | Salt Lake City, UT +1 801 266 7700 | York, PA +1 717 505 5280

Page 1 of 2

COC ID: 057206

22051511

MANNIK&SMITH: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill

ALS Project Manager:		ALS Work Order #:	

		Project Information		Parameter/Method Request for Analysis
Work Order		Project Name	MT. PLEASANT LANDFILL	A PCBs
Company Name	MANNIK+SMITH (CANTON)	Project Number	M346 0003	B VOCs
Send Report To	D. ADLER	Bill To Company	MANNIK+SMITH	C SVOCs
Address	2365 HAGGERTY RD. SOUTH CANTON, MI 48188	Invoice Attn	D. ADLER	D METALS- 10 MICH METALS + AL, Sb, Be, B, Ni, Th,
City/State/Zip		Address		E
Phone	7347905164	City/State/Zip		F PFAS - ISTOPE DILUTION- SEE ATTACHED LIST - EGLE 10/1/2019
Fax		Phone		G
e-Mail Address	DADLER@MANNIKSMITHGROUP.COM	Fax		H
		e-Mail Address		I
				J

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-101	5-16-22	1500	GROUND WATER		10	X	X	X	X	X						
2	MW-102		1446														
3	MW-103		1249														
4	MW-104		1302														
5	MW-105		1342														
6	MW-106		1410														
7	MW-200		1555														
8	MW-201		1645														
9	MW-202		1145														
10	~~MW-10-20~~ MW-10-20	5-16-22	1553	GROUND WATER		10											

Sampler(s) Please Print & Sign: D. ADLER

Shipment Method:

Turnaround Time in Business Days (BD): ☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD — STANDARD

Results Due Date:

	Date:	Time:		
Relinquished by:	5/17/22	1447	Received by:	
Relinquished by: QS	5/17/22	2350	Received by (Laboratory):	
Logged by (Laboratory):	5/18/22	0957	Checked by (Laboratory):	

Notes:

Cooler ID	Cooler Temp.
IR1	3.0
	3.2
pH32	4.6

QC Package: (Check One Box Below)
☐ Level II Std QC ☐ TRRP Checklist
☐ Level III Std QC/Raw Date ☐ TRRP Level IV
☐ Level IV SW846/CLP
☐ Other

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

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Fort Collins, CO
+1 970 490 1511
MI
99 6070
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South Charleston, WV
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Middletown, PA
+1 717 944 5541
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+1 801 266 7700
York, PA
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Chain of Custody Form

22051511

MANNIK&SMITH: The Mannik & Smith Group, Inc.
Project: Former Mount Pleasant Landfill

Page 2 of 2

COC ID: 057205

ALS Project Manager: | ALS Work Order #:

	Project Information		Parameter/Method Request for Analysis	
Purcl		Name		A PCBs
Work Order		umber	MT. PLEASANT LANDFILL	B VOCs
Company Name	MANNIK+SMITH-CANTON	Bill To Company	M3460003	C SVOCs
Send Report To	D. ADLER	Invoice Attn	MANNIK+SMITH-D. ADLER	D METALS - 10 MICH + AL, Sb, Be, B, Ni, Tl
Address		Address		E PFAS - ISOTOPE DILUTION - SEE ATTACHED
				F LIST - EGLE 10/1/2019
City/State/Zip		City/State/Zip		G
Phone	7347905164	Phone		H
Fax		Fax		I
e-Mail Address	DADLER@M	e-Mail Address		J

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	MW-14-20	5-16-22	1055	GROUND WATER		10											
2	MW-15-20	5-16-22	1025	GROUND WATER		10											
3	~~FIELD~~ FIELD BLANK	5-16-22	1545	LAB WATER		2											
4	DUP	5-16-22		GROUND WATER		10											
5	TRIP BLANK																
6	MW-109	5/16/22		GW		10	X	X	X	X	X						
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: D. ADLER

Shipment Method:

Turnaround Time in Business Days (BD): STANDARD ☐ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD

Results Due Date:

Relinquished by:	Date: 5/17/22	Time: 1447	Received by:
Relinquished by:	Date: 5/17/22	Time: 2250	Received by (Laboratory):
Logged by (Laboratory):	Date: 5/18/22	Time: 0957	Checked by (Laboratory):

Notes:

Cooler ID	Cooler Temp.
IR1	3.0
	3.2
pt32	4.6

QC Package: (Check One Box Below)
☐ Level II Std QC ☐ TRRP Checklist
☐ Level III Std QC/Raw Date ☐ TRRP Level IV
☐ Level IV SW846/CLP
☐ Other

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Group, USA

Sample Receipt Checklist

Client Name: **MANNIK&SMITH** Date/Time Received: **17-May-22 23:50**

Work Order: **22051511** Received by: **LYS**

Checklist completed by Lydia Sweet (eSignature) 18-May-22 (Date) Reviewed by: (eSignature) (Date)

Matrices: Water
Carrier name: Courier

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	3.0/3.0, 3.2/3.2, 4.6/4.6c	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	5/18/2022 10:56:15 AM		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES (PFAS) MINIMUM LABORATORY ANALYTE LIST

Below is the minimum laboratory PFAS analyte list for analysis of deer, drinking water, groundwater, surface water, soil, wastewater effluent, and landfill leachate samples collected by Michigan's Departments of Environment, Great Lakes, and Energy, Health and Human Services, Agriculture and Rural Development, and Natural Resources.

This minimum analyte list was developed based on the potential for these chemicals to be found in Michigan, the availability of the chemical standards used for testing, and the ability of available laboratories to test for these PFAS. This list includes PFAS that can be tested for in drinking water using United States Environmental Protection Agency (USEPA) Methods 537 Rev.1.1 or 537.1, which are the only methods that should be used when analyzing drinking water samples. Other testing methodology may be used to test for PFAS in other media (not drinking water). This list is not exhaustive of PFAS in Michigan's environment.

A fish icon (🐟) precedes those compounds that are also currently being tested for in fish tissue.

Analyte Name	Acronym	Fluorinated Carbon Chain Length	Molecular Formula	CAS Number	USEPA Method 537 Rev. 1.1	USEPA Method 537.1
🐟 Perfluorotetradecanoic acid	PFTeA	C_{14}	$C_{13}F_{27}COOH$	376-06-7	X	X
🐟 Perfluorotridecanoic acid	PFTriA	C_{13}	$C_{12}F_{25}COOH$	72629-94-8	X	X
🐟 Perfluorododecanoic acid	PFDoA	C_{12}	$C_{11}F_{23}COOH$	307-55-1	X	X
🐟 Perfluoroundecanoic acid	PFUnA	C_{11}	$C_{10}F_{21}COOH$	2058-94-8	X	X
🐟 Perfluorodecanoic acid	PFDA	C_{10}	$C_9F_{19}COOH$	335-76-2	X	X
🐟 Perfluorononanoic acid	PFNA	C_9	$C_8F_{17}COOH$	375-95-1	X	X
🐟 Perfluorooctanoic acid	PFOA	C_8	$C_7F_{15}COOH$	335-67-1	X	X
🐟 Perfluoroheptanoic acid	PFHpA	C_7	$C_6F_{13}COOH$	375-85-9	X	X
🐟 Perfluorohexanoic acid	PFHxA	C_6	$C_5F_{11}COOH$	307-24-4	X	X
🐟 Perfluoropentanoic acid	PFPeA	C_5	C_4F_9COOH	2706-90-3		
🐟 Perfluorobutanoic acid	PFBA	C_4	C_3F_7COOH	375-22-4		
🐟 Perfluorodecanesulfonic acid	PFDS	C_{10}	$C_{10}F_{21}SO_3H$	335-77-3		

EGLE Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Minimum Laboratory Analyte List

Analyte Name	Acronym	Fluorinated Carbon Chain Length	Molecular Formula	CAS Number	USEPA Method 537 Rev. 1.1	USEPA Method 537.1
Perfluorononanesulfonic acid	PFNS	C_9	$C_9F_{19}SO_3H$	68259-12-1		
Perfluorooctanesulfonic acid	PFOS	C_8	$C_8F_{17}SO_3H$	1763-23-1	X	X
Perfluoroheptanesulfonic acid	PFHpS	C_7	$C_7F_{15}SO_3H$	375-92-8		
Perfluorohexanesulfonic acid	PFHxS	C_6	$C_6F_{13}SO_3H$	355-46-4	X	X
Perfluoropentanesulfonic acid	PFPeS	C_5	$C_5F_{11}SO_3H$	2706-91-4		
Perfluorobutanesulfonic acid	PFBS	C_4	$C_4F_9SO_3H$	375-73-5	X	X
Perfluorooctanesulfonamide	PFOSA	C_8	$C_8F_{17}SO_2NH_2$	754-91-6		
Fluorotelomer sulphonic acid 8:2	FtS 8:2	C_8	$C_8F_{17}CH_2CH_2SO_3$	39108-34-4		
Fluorotelomer sulphonic acid 6:2	FtS 6:2	C_6	$C_6F_{13}CH_2CH_2SO_3$	27619-97-2		
Fluorotelomer sulphonic acid 4:2	FtS 4:2	C_4	$C_4F_9CH_2CH_2SO_3$	757124-72-4		
2-(N-Ethylperfluorooctanesulfonamido) acetic acid	N-EtFOSAA	C_8	$C_8F_{17}SO_2N(C_2H_5)CH_2COOH$	2991-50-6	X	X
2-(N-Methylperfluorooctanesulfonamido) acetic acid	N-MeFOSAA	C_8	$C_8F_{17}SO_2N(CH_3)CHCOOH$	2355-31-9	X	X
Hexafluoropropylene oxide dimer acid	HFPO-DA	C_6	$C_6HF_{11}O_3$	13252-13-6		X
11-chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	11Cl-PF3OUdS	C_{10}	$C_{10}HF_{20}ClSO_4$	763051-92-9		X
9-chlorohexadecafluoro-3-oxanone-1-sulfonic acid	9Cl-PF3ONS	C_8	$C_8HF_{16}ClSO_4$	756426-58-1		X
4,8-dioxa-3H-perfluorononanoic acid	ADONA	C_7	$C_7H_2F_{12}O_4$	919005-14-4		X

APPENDIX E
SOIL SAMPLE TEST DATA

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

SUMMARY OF LABORATORY RESULTS

AASHTO R18

CLIENT City of Mt. Pleasant, MI **PROJECT NAME** Former Mt Pleasant Landfill

PROJECT NUMBER M3460003 **PROJECT LOCATION** Mt. Pleasant, MI

Boring No. / Sample No.	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Bulk Density (pcf)	Satur-ation (%)	Specific Gravity
MW-200 / 17-20	17.0	NP	NP	NP	25	4	SP				
MW-200 / 25.5-30	25.5	31	14	17	4.75	95	CL				
MW-200 / 37-39.5	37.0	23	11	12	9.525	63	CL				
MW-201 / 20-24	20.0	NP	NP	NP	19	16	SM				
MW-201 / 29-30	29.0	33	16	17	4.75	99	CL				
MW-201 / 39-40	39.0	17	10	7	9.525	49	SC-SM				
MW-202 / 5-7	5.0	NP	NP	NP	25	2	GW				
MW-202 / 8.5-10	8.5	20	10	10	4.75	55	CL				
SB-19 / 34-35	34.0	17	9	8	4.75	49	SC				
SB-19 / 47-49	47.0	19	10	9	9.525	56	CL				
SB-20 / 45-50	45.0	19	10	9	9.525	55	CL				
SB-21 / 23-25	23.0	20	10	10	19	55	CL				

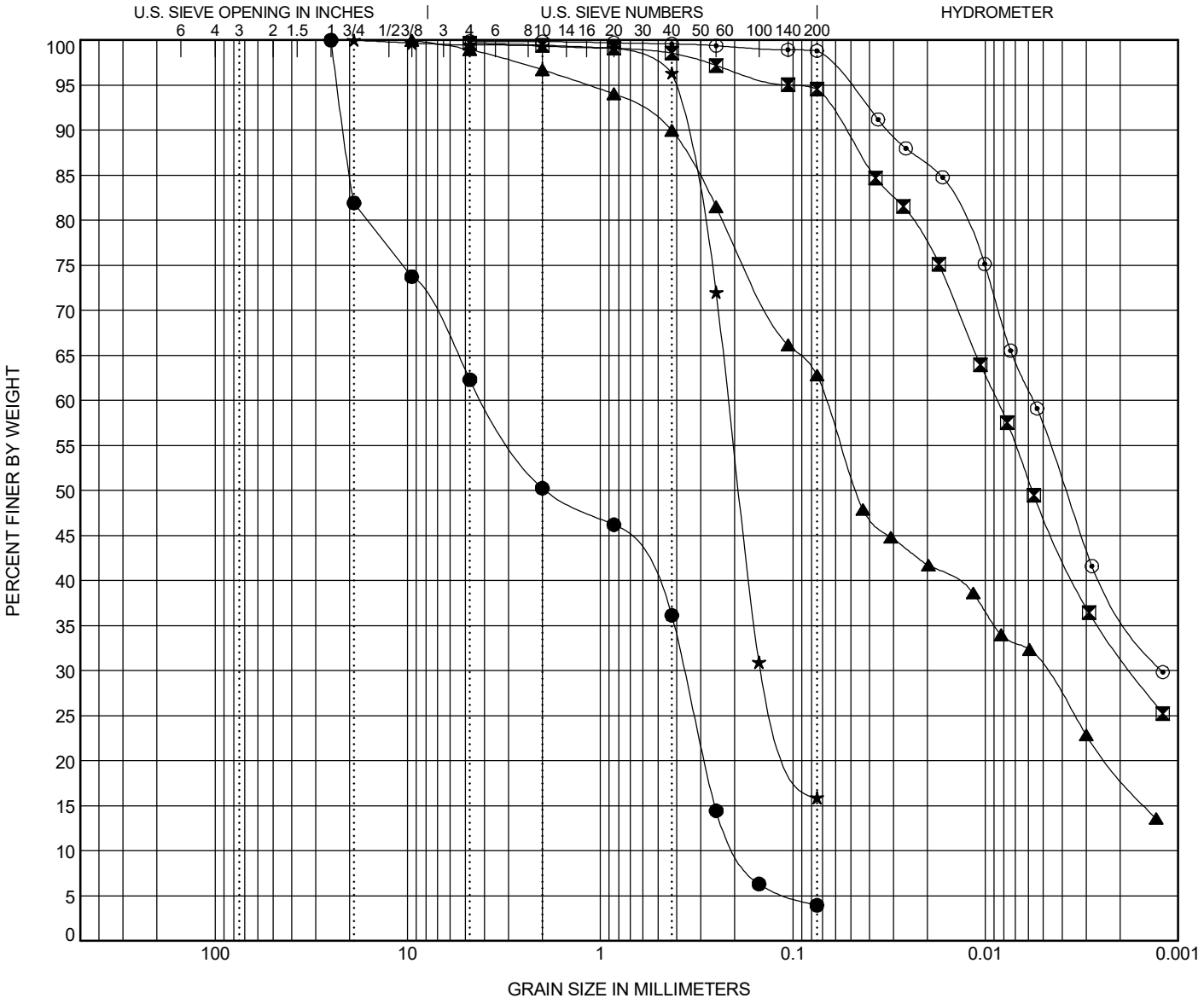
GRAIN SIZE DISTRIBUTION

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

AASHTO R18

CLIENT City of Mt. Pleasant, MI **PROJECT NAME** Former Mt Pleasant Landfill

PROJECT NUMBER M3460003 **PROJECT LOCATION** Mt. Pleasant, MI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	MW-200 / 17-20	17.0	POORLY GRADED SAND with GRAVEL (SP)	NP	NP	NP	0.18	21.30
⊠	MW-200 / 25.5-30	25.5	LEAN CLAY (CL)	31	14	17		
▲	MW-200 / 37-39.5	37.0	SANDY LEAN CLAY (CL)	23	11	12		
★	MW-201 / 20-24	20.0	SILTY SAND (SM)	NP	NP	NP		
⊙	MW-201 / 29-30	29.0	LEAN CLAY (CL)	33	16	17		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	MW-200 / 17-20	17.0	25	4.026	0.366	0.189	37.7	58.3	4.0	
⊠	MW-200 / 25.5-30	25.5	4.75	0.009	0.002			5.1	62.8	31.7
▲	MW-200 / 37-39.5	37.0	9.525	0.068	0.005		1.1	36.1	44.4	18.4
★	MW-201 / 20-24	20.0	19	0.215	0.144		0.5	83.6	15.9	
⊙	MW-201 / 29-30	29.0	4.75	0.006	0.001			1.1	61.9	36.9

GRAIN SIZE DISTRIBUTION

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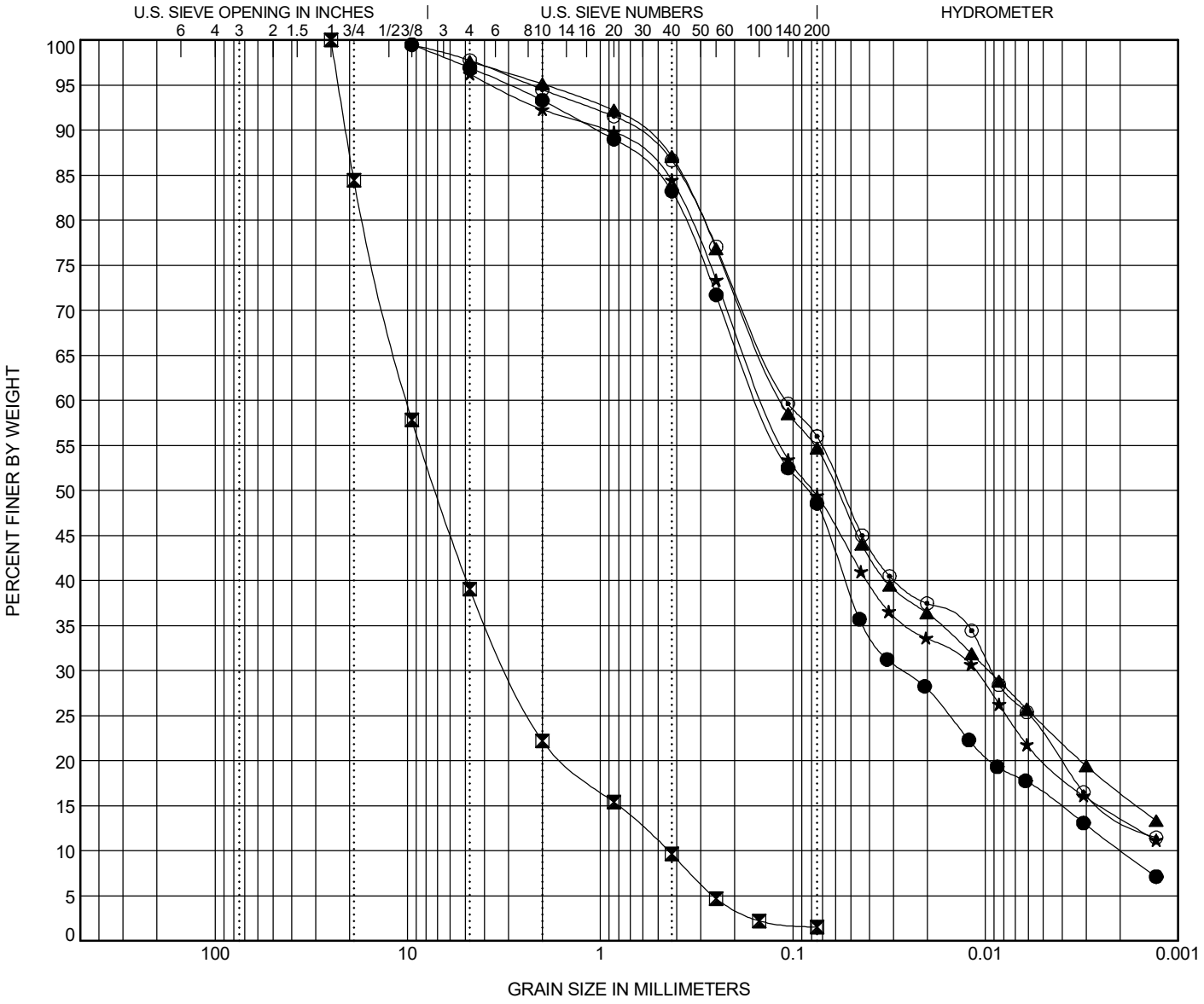
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

AASHTO R18

CLIENT City of Mt. Pleasant, MI **PROJECT NAME** Former Mt Pleasant Landfill

PROJECT NUMBER M3460003 **PROJECT LOCATION** Mt. Pleasant, MI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● MW-201 / 39-40	39.0	SILTY, CLAYEY SAND (SC-SM)	17	10	7	2.47	75.13
⊠ MW-202 / 5-7	5.0	WELL-GRADED GRAVEL with SAND (GW)	NP	NP	NP	1.99	22.71
▲ MW-202 / 8.5-10	8.5	SANDY LEAN CLAY (CL)	20	10	10		
★ SB-19 / 34-35	34.0	CLAYEY SAND (SC)	17	9	8		
⊙ SB-19 / 47-49	47.0	SANDY LEAN CLAY (CL)	19	10	9		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● MW-201 / 39-40	39.0	9.525	0.148	0.027	0.002	2.6	48.4	38.5	10.1
⊠ MW-202 / 5-7	5.0	25	10.07	2.984	0.443	61.0	37.5	1.5	
▲ MW-202 / 8.5-10	8.5	4.75	0.114	0.01			42.9	38.2	16.5
★ SB-19 / 34-35	34.0	4.75	0.14	0.011			46.8	35.8	13.6
⊙ SB-19 / 47-49	47.0	9.525	0.108	0.009		1.7	41.7	42.1	14.0

GRAIN SIZE DISTRIBUTION

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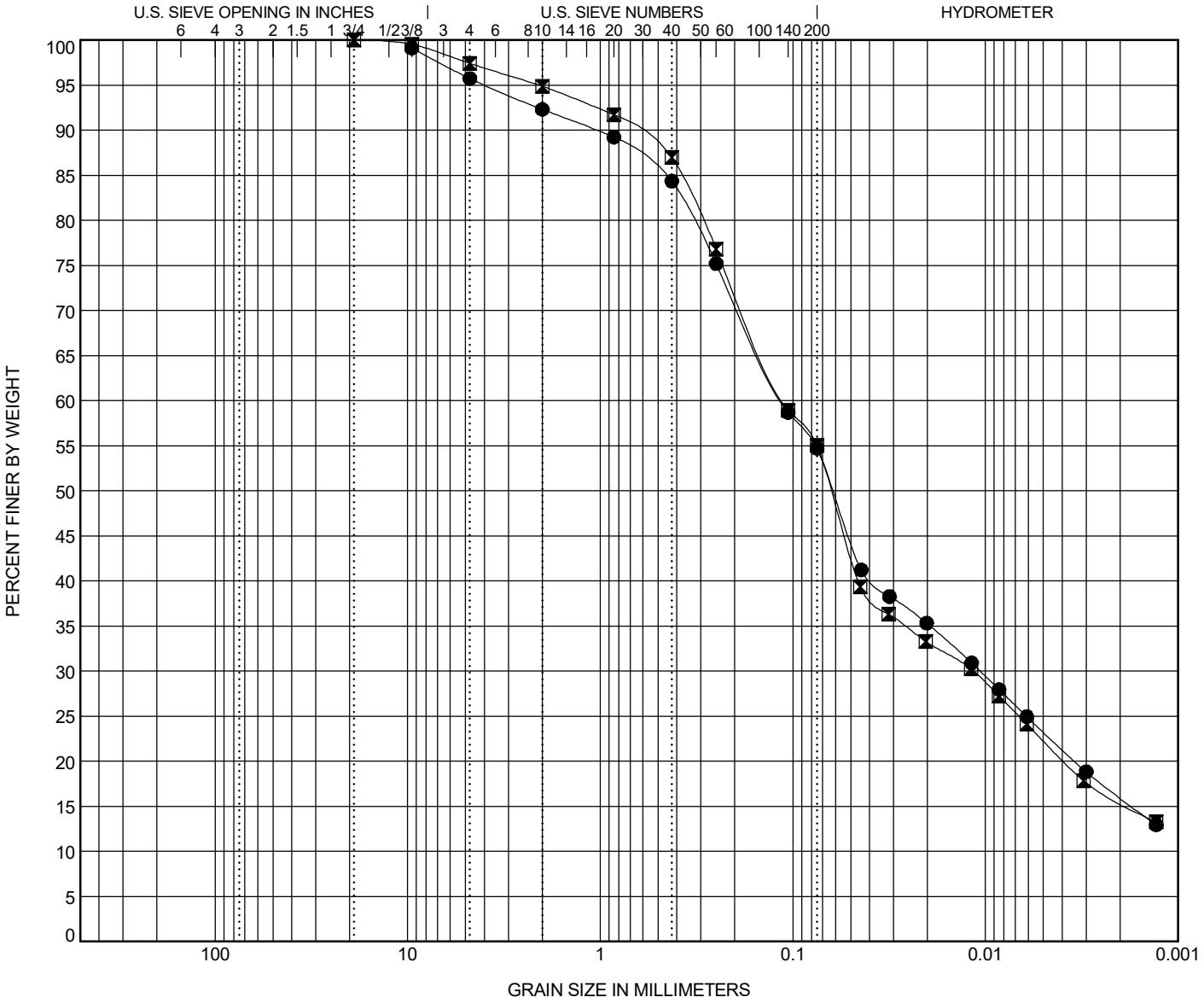
AASHTO R18

CLIENT City of Mt. Pleasant, MI **PROJECT NAME** Former Mt Pleasant Landfill

PROJECT NUMBER M3460003 **PROJECT LOCATION** Mt. Pleasant, MI



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● SB-20 / 45-50	45.0	SANDY LEAN CLAY (CL)	19	10	9		
⊠ SB-21 / 23-25	23.0	SANDY LEAN CLAY (CL)	20	10	10		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● SB-20 / 45-50	45.0	9.525	0.113	0.011		3.4	41.0	38.7	16.0
⊠ SB-21 / 23-25	23.0	19	0.111	0.012		2.6	42.4	39.5	15.6

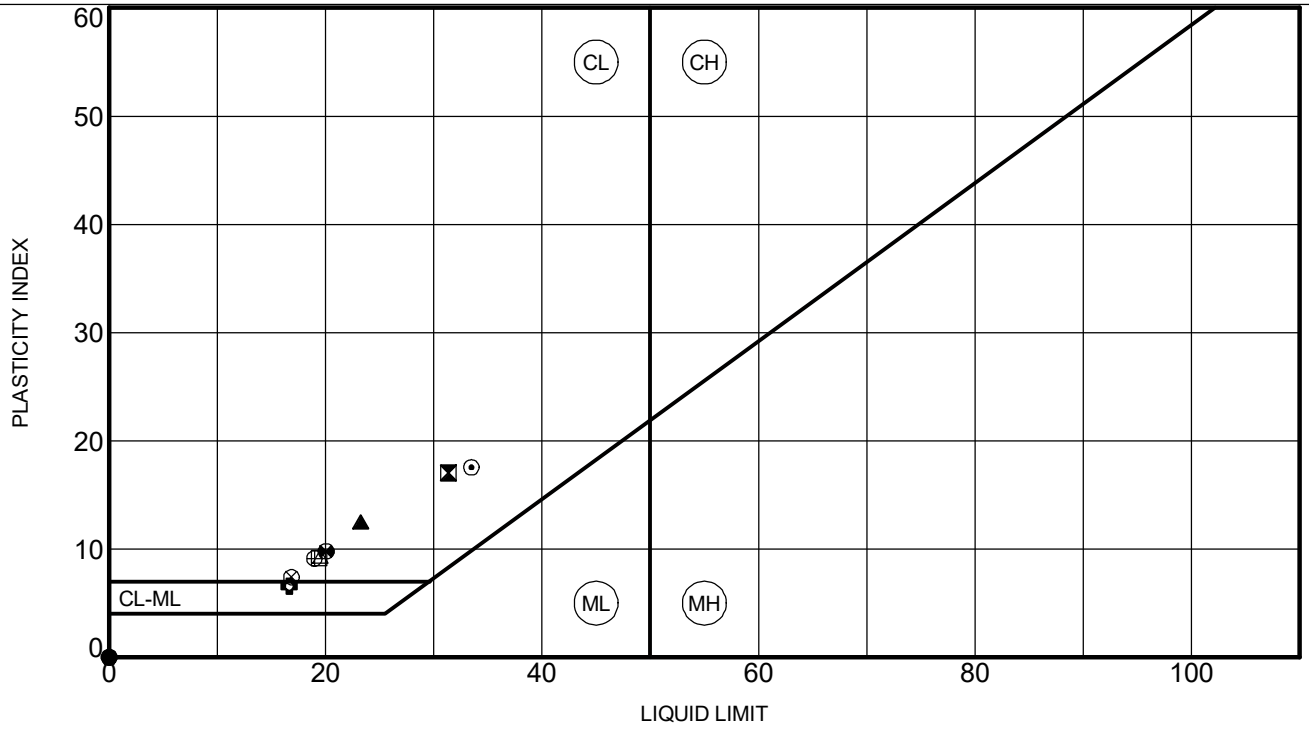
ATTERBERG LIMITS RESULTS

The Mannik & Smith Group, Inc.
2365 Haggerty Road South, Canton, MI 48188
ph: (734) 397-3100 fax: (734) 397-3131
www.manniksmithgroup.com

AASHTO R18

CLIENT City of Mt. Pleasant, MI **PROJECT NAME** Former Mt Pleasant Landfill

PROJECT NUMBER M3460003 **PROJECT LOCATION** Mt. Pleasant, MI



	Specimen Identification		LL	PL	PI	Fines	Classification
●	MW-200 / 17-20	17.0	NP	NP	NP	4	POORLY GRADED SAND with GRAVEL (SP)
⊠	MW-200 / 25.5-30	25.5	31	14	17	95	LEAN CLAY (CL)
▲	MW-200 / 37-39.5	37.0	23	11	12	63	SANDY LEAN CLAY (CL)
★	MW-201 / 20-24	20.0	NP	NP	NP	16	SILTY SAND (SM)
⊙	MW-201 / 29-30	29.0	33	16	17	99	LEAN CLAY (CL)
✿	MW-201 / 39-40	39.0	17	10	7	49	SILTY, CLAYEY SAND (SC-SM)
○	MW-202 / 5-7	5.0	NP	NP	NP	2	WELL-GRADED GRAVEL with SAND (GW)
△	MW-202 / 8.5-10	8.5	20	10	10	55	SANDY LEAN CLAY (CL)
⊗	SB-19 / 34-35	34.0	17	9	8	49	CLAYEY SAND (SC)
⊕	SB-19 / 47-49	47.0	19	10	9	56	SANDY LEAN CLAY (CL)
□	SB-20 / 45-50	45.0	19	10	9	55	SANDY LEAN CLAY (CL)
⊛	SB-21 / 23-25	23.0	20	10	10	55	SANDY LEAN CLAY (CL)

Overview

Project Name
Sidewalk Replacement

Total Requested
$150,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Low

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
jmoore@mt-pleasant.org

Applicant Email
Jason Moore

Organization
City of MtPleasant

Address
320 W Broadway St
MOUNT PLEASANT , 48858

Phone Number
9897795405

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Infrastructure

Project Description

Each year the City invests in maintenance of the sidewalk system. Focus is generally placed on identifiable hazards such as large obstacles and trees blocking sidewalk paths, small lips and cracks, pocketing water and spalling. Replacement sidewalks are built to coincide with planned street and water main replacement projects.

This project would replace sidewalk in various locations within the city.

Benefit Description

Since 1996, sidewalk has been replaced each year throughout the City. The Division of Public Works has created a sidewalk rating system so that the sidewalk replacement list can be prioritized and this project would address the worst sidewalk within the city.

Funding Requirements

Sidewalk replacement is an ongoing expense.

Project Timeline

Not Entered

Budget Items

Name	Cost	Quantity	Total	Category
Sidewalk Replacement - Various Locations	$150,000.00	1	$150,000.00	Infrastructure
AmountRequested	**$150,000.00**			

Matching Funds

Name	Cost	Quantity	Total
No Matching Funds items have been added.			
AmountMatched	**$0.00**		

Budget Summary

Amount Requested

$150,000.00

Amount Matched

$0.00

Total Amount

$150,000.00

Uploaded Files

Name
No files have been uploaded.

There are no comments to display.

Overview

Project Name
Mt. Pleasant Police Vehicle and Body Camera Project

Total Requested
$162,000.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Critical

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
plauria@mt-pleasant.org

Applicant Email
Paul Lauria

Organization
Mt. Pleasant Police and Fire Department

Address
804 E. High St
Mount Pleasant , 48858

Phone Number
9893304378

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Safety/Security

Project Description

At the Fall 2023 Two-Percent Disbursement, the Saginaw Chippewa Indian Tribe awarded $ 244,620 of $ 406,620 towards this project. At that time, the Tribe expressed a willingness to fund the remaining $162,000 at a future disbursement. This is the request for the remaining funds needed to complete and implement this project.

This project is for the replacement of 9 patrol vehicle camera systems and 30 police body worn cameras. Our current vehicle camera system, L3 Mobile Vision was installed in 2014 and is past its service life. Many of the components are broken and are no longer available. In addition, this system cannot be upgraded to include body worn cameras that are used by police officers.

Having a totally integrated vehicle and body worn camera system is the most effective and seamless way to implement a comprehensive system. For this reason, Axon Inc was chosen as the system to meets this need. This project will be completed in its entirety in one

phase. Axon Inc is a leading manufacturer of a comprehensive vehicle and body worn camera system. The Axon vehicle cameras come with the latest technology of LPR (license plate readers), body microphone for audio recordings and tamperproof automatic downloading of video evidence. The recorded events are stored in the "cloud" and access is only given to authorized personnel. This video evidence in then used in court proceedings and other matters such as citizens' complaints to verify what did or did not occur. This project now includes the immediate implementation of 30 body worn cameras. Previous concerns pertaining to Freedom of Information Requests will be addressed if the need arises. While we expect the number of requests
is going to increase significantly, we feel that ongoing reviews of workloads will address these concerns.

Benefit Description

The benefits of this project are vast. Having up-to-date high quality video equipment and software provides the community with the transparency it demands. Video evidence is the first aspect that is requested when a police officers' actions are being questioned. This video evidence provides an unbiased look at what took place during a specific incident. It eliminates the bias of the facts given by the officer and the other party involved. It allows the viewer to make their own assessment of the events that took place. The video of an incident can then be used by the police department for training officers, officer accountability, policy development and changes, civil and criminal court proceedings, as well as to build confidence and credibility with the entire
community.

Funding Requirements

Maintenance of the vehicle and body cameras will be covered within the annual police department's budget.

Project Timeline

The purchase of the body cameras has already begun. The funds awarded from the Fall 2023 Two-Percent Disbursement were used. However, Patrol Vehicle Cameras and the software that implements into the body cameras needs to be purchased to complete the system and project. If awarded the remaining funds, this project will be completed and implemented by July 2024. Thank you for your consideration!

Budget Items

Name	Cost	Quantity	Total	Category
Axon Patrol Vehicle Camera	$18,000.00	9	$162,000.00	Safety/Security
AmountRequested	**$162,000.00**			

Matching Funds

Name	Cost	Quantity	Total
No Matching Funds items have been added.			
AmountMatched	**$0.00**		

Budget Summary

Amount Requested

$162,000.00

Amount Matched

$0.00

Total Amount

$162,000.00

Uploaded Files

Name
Q426041448313KUNew20230907_2024-03-01.pdf

There are no comments to display.

Axon Enterprise, Inc.
17800 N 85th St.
Scottsdale, Arizona 85255
United States
VAT: 86-0741227
Domestic: (800) 978-2737
International: +1.800.978.2737

Q-426041-44831.813KU
Issued: 09/27/2022
Quote Expiration: 11/15/2022
EST Contract Start Date: 12/01/2022
Account Number: 323132
Payment Terms: N30
Delivery Method:

SHIP TO	BILL TO
Business;Delivery;Invoice-804 E High St 804 E High St Mount Pleasant, MI 48858-3595 USA	Mount Pleasant Police Dept. - MI 804 E High St Mount Pleasant, MI 48858-3595 USA Email:

SALES REPRESENTATIVE	PRIMARY CONTACT
Keith Utter Phone: Email: kutter@axon.com Fax:	Paul Lauria Phone: (989) 779-5108 Email: plauria@mt-pleasant.org Fax: (989) 773-4020

Program Length	60 Months
TOTAL COST	$406,620.72
ESTIMATED TOTAL W/ TAX	$418,091.07

Bundle Savings	$113,584.38
Additional Savings	$10,802.30
TOTAL SAVINGS	$124,386.68

PAYMENT PLAN

PLAN NAME	INVOICE DATE	AMOUNT DUE
Year 1	Nov, 2022	$62,280.00
Year 1	Jun, 2023	$17,683.36
True Up	Jun, 2023	$6,804.00
Year 2	Nov, 2023	$62,280.00
Year 2	Nov, 2023	$17,683.34
Year 3	Nov, 2024	$62,280.00
Year 3	Nov, 2024	$17,683.34
Year 4	Nov, 2025	$62,280.00

Year 4	Nov, 2025	$17,683.34
Year 5	Nov, 2026	$62,280.00
Year 5	Nov, 2026	$17,683.34

BILLED ON FULFILLMENT		
PLAN NAME	INVOICE DATE	AMOUNT DUE
None	As Fulfilled	$0.00

Quote Details

Bundle Summary

Item	Description	QTY
Core+	2021 Core+	30
Fleet3A	Fleet 3 Advanced	9
DynamicBundle	Dynamic Bundle	1
DynamicBundle	Dynamic Bundle	1

Bundle: 2021 Core+ Quantity: 30 Start: 12/1/2022 End: 11/30/2027 Total: 286200 USD

Category	Item	Description	QTY
Bundle Scaler	999999	BUNDLE SCALER	1
Bundle Scaler	999999	BUNDLE SCALER	1
Signal Sidearm Kit	75015	SIGNAL SIDEARM KIT	30
Warranty	80465	EXT WARRANTY, MULTI-BAY DOCK (TAP)	4
Camera Warranty	80464	EXT WARRANTY, CAMERA (TAP)	30
E.com License	73746	PROFESSIONAL EVIDENCE.COM LICENSE	30
Respond License	73449	RESPOND DEVICE LICENSE	30
Multi-bay Dock Refresh 1	73689	MULTI-BAY BWC DOCK 1ST REFRESH	4
Device Storage	73686	EVIDENCE.COM UNLIMITED AXON DEVICE STORAGE	30
Auto Tagging	73682	AUTO TAGGING LICENSE	30
Camera Refresh 1 with Spares	73309	AXON CAMERA REFRESH ONE	31
Camera Refresh 2 with Spares	73310	AXON CAMERA REFRESH TWO	31
Multi-bay Dock Refresh 2	73688	MULTI-BAY BWC DOCK 2ND REFRESH	4

A La Carte Storage	73683	10 GB EVIDENCE.COM A-LA-CART STORAGE-	90
Spare Camera Warranty	80464	EXT WARRANTY, CAMERA (TAP)	1
Signal Sidearm Batteries	71044	BATTERY, SIGNAL SIDEARM, CR2430 SINGLE PACK	60
Dock Mount	70033	WALL MOUNT BRACKET, ASSY, EVIDENCE.COM DOCK	1
Dock Power Cord	71019	NORTH AMER POWER CORD FOR AB3 8-BAY, AB2 1-BAY / 6-BAY DOCK	1
Camera	73202	AXON BODY 3 - NA10 - US - BLK - RAPIDLOCK	30
Spare Camera	73202	AXON BODY 3 - NA10 - US - BLK - RAPIDLOCK	1
Camera Mount	74028	WING CLIP MOUNT, AXON RAPIDLOCK	33
USB	11534	USB-C to USB-A CABLE FOR AB3 OR FLEX 2	33
Dock	74210	AXON BODY 3 - 8 BAY DOCK	4
Power Cord	71019	NORTH AMER POWER CORD FOR AB3 8-BAY, AB2 1-BAY / 6-BAY DOCK	4

Other	80395	EXT WARRANTY, TASER 7 HANDLE	30
Other	80395	EXT WARRANTY, TASER 7 HANDLE	1
Other	80374	EXT WARRANTY, TASER 7 BATTERY PACK	36
Other	80396	EXT WARRANTY, TASER 7 SIX BAY DOCK	1

Bundle: Fleet 3 Advanced Quantity: 9 Start: 7/1/2023 End: 11/30/2027 Total: 88416.72 USD

Category	Item	Description	QTY
Bundle Scaler	999999	BUNDLE SCALER	1
Storage	80410	FLEET, UNLIMITED STORAGE, 1 CAMERA	18
E.com License	80400	FLEET, VEHICLE LICENSE	9
ALPR License	80401	FLEET 3, ALPR LICENSE, 1 CAMERA	9
Respond License	80402	RESPOND DEVICE LICENSE - FLEET 3	9
Camera Kit & Warranty	72036	FLEET 3 STANDARD 2 CAMERA KIT	9
Vehicle Installation	73391	FLEET 3 NEW INSTALLATION (PER VEHICLE)	9
Camera Refresh	72040	FLEET REFRESH, 2 CAMERA KIT	9
Axon Signal Unit	70112	AXON SIGNAL UNIT	9
Other	80495	EXT WARRANTY, FLEET 3, 2 CAMERA KIT	9
Other	80379	EXT WARRANTY, AXON SIGNAL UNIT	9

Bundle: Dynamic Bundle Quantity: 1 Start: 12/1/2022 End: 6/30/2023 Total: 6804 USD

Category	Item	Description	QTY
Other	80462	FLEET 3 ADVANCED BUNDLE WITH TAP TRUE UP	9

Individual Items USD

Category	Item	Description	QTY
Other	73447	RESPOND DEVICE TO RESPOND DEVICE PLUS UPGRADE LICENSE	30

Tax is estimated based on rates applicable at date of quote and subject to change at time of invoicing. If a tax exemption certificate should be applied, please submit prior to invoicing.

Standard Terms and Conditions

Axon Enterprise Inc. Sales Terms and Conditions

Axon Master Services and Purchasing Agreement:

This Quote is limited to and conditional upon your acceptance of the provisions set forth herein and Axon's Master Services and Purchasing Agreement (posted at www.axon.com/legal/sales-terms-and-conditions), as well as the attached Statement of Work (SOW) for Axon Fleet and/or Axon Interview Room purchase, if applicable. In the event you and Axon have entered into a prior agreement to govern all future purchases, that agreement shall govern to the extent it includes the products and services being purchased and does not conflict with the Axon Customer Experience Improvement Program Appendix as described below.

ACEIP:

The Axon Customer Experience Improvement Program Appendix, which includes the sharing of de-identified segments of Agency Content with Axon to develop new products and improve your product experience (posted at www.axon.com/legal/sales-terms-and-conditions), is incorporated herein by reference. By signing below, you agree to the terms of the Axon Customer Experience Improvement Program.

Acceptance of Terms:

Any purchase order issued in response to this Quote is subject solely to the above referenced terms and conditions. By signing below, you represent that you are lawfully able to enter into contracts. If you are signing on behalf of an entity (including but not limited to the company, municipality, or government agency for whom you work), you represent to Axon that you have legal authority to bind that entity. If you do not have this authority, please do not sign this Quote.

Signature

Date Signed

9/27/2022

FLEET STATEMENT OF WORK BETWEEN AXON ENTERPRISE AND AGENCY

Introduction

This Statement of Work ("SOW") has been made and entered into by and between Axon Enterprise, Inc. ("AXON"), and Mount Pleasant Police Dept. - MI the ("AGENCY") for the purchase of the Axon Fleet in-car video solution ("FLEET") and its supporting information, services and training. (AXON Technical Project Manager/The AXON installer)

Purpose and Intent

AGENCY states, and AXON understands and agrees, that Agency's purpose and intent for entering into this SOW is for the AGENCY to obtain from AXON deliverables, which used solely in conjunction with AGENCY's existing systems and equipment, which AGENCY specifically agrees to purchase or provide pursuant to the terms of this SOW.

This SOW contains the entire agreement between the parties. There are no promises, agreements, conditions, inducements, warranties or understandings, written or oral, expressed or implied, between the parties, other than as set forth or referenced in the SOW.

Acceptance

Upon completion of the services outlined in this SOW, AGENCY will be provided a professional services acceptance form ("Acceptance Form"). AGENCY will sign the Acceptance Form acknowledging that services have been completed in substantial conformance with this SOW and the Agreement. If AGENCY reasonably believes AXON did not complete the professional services in conformance with this SOW, AGENCY must notify AXON in writing of the specific reasons within seven (7) calendar days from delivery of the Acceptance Form. AXON will remedy the issues to conform with this SOW and re-present the Acceptance Form for signature. If AXON does not receive the signed Acceptance Form or written notification of the reasons for rejection within 7 calendar days of the delivery of the Acceptance Form, AGENCY will be deemed to have accepted the services in accordance to this SOW.

Force Majeure

Neither party hereto shall be liable for delays or failure to perform with respect to this SOW due to causes beyond the party's reasonable control and not avoidable by diligence.

Schedule Change

Each party shall notify the other as soon as possible regarding any changes to agreed upon dates and times of Axon Fleet in-car Solution installation to be performed pursuant of this Statement of Work.

Axon Fleet Deliverables

Typically, within (30) days of receiving this fully executed SOW, an AXON Technical Project Manager will deliver to AGENCY's primary point of contact via electronic media, controlled documentation, guides, instructions and videos followed by available dates for the initial project review and customer readiness validation. Unless otherwise agreed upon by AXON, AGENCY may print and reproduce said documents for use by its employees only.

Security Clearance and Access

Upon AGENCY's request, AXON will provide the AGENCY a list of AXON employees, agents, installers or representatives which require access to the AGENCY's facilities in order to perform Work pursuant of this Statement of Work. AXON will ensure that each employee, agent or representative has been informed or and consented to a criminal background investigation by AGENCY for the purposes of being allowed access to AGENCY's facilities. AGENCY is responsible for providing AXON with all required instructions and documentation accompanying the security background check's requirements.

Training

AXON will provide training applicable to Axon Evidence, Cradlepoint NetCloud Manager and Axon Fleet application in a train-the-trainer style method unless otherwise agreed upon between the AGENCY and AXON.

Local Computer

AGNECY is responsible for providing a mobile data computer (MDC) with the same software, hardware, and configuration that AGENCY personnel will use with the AXON system being installed. AGENCY is responsible for making certain that any and all security settings (port openings, firewall settings, antivirus software, virtual private network, routing, etc.) are made prior to the installation, configuration and testing of the aforementioned deliverables.

Network

AGENCY is responsible for making certain that any and all network(s) route traffic to appropriate endpoints and AXON is not liable for network breach, data interception, or loss of data due to misconfigured firewall settings or virus infection, except to the extent that such virus or infection is caused, in whole or in part, by defects in the deliverables.

Cradlepoint Router

When applicable, AGENCY must provide AXON Installers with temporary administrative access to Cradlepoint's NetCloud Manager to the extent necessary to perform Work pursuant of this Statement of Work.

Evidence.com

AGENCY must provide AXON Installers with temporary administrative access to Axon Evidence.com to the extent necessary to perform Work pursuant of this SOW.

Wireless Upload System

If purchased by the AGENCY, on such dates and times mutually agreed upon by the parties, AXON will install and configure into AGENCY's existing network a wireless network infrastructure as identified in the AGENCY's binding quote based on conditions of the sale.

VEHICLE INSTALLATION

Preparedness

On such dates and times mutually agreed upon by the parties, the AGENCY will deliver all vehicles to an AXON Installer less weapons and items of evidence. Vehicle(s) will be deemed 'out of service' to the extent necessary to perform Work pursuant of this SOW.

Existing Mobile Video Camera System Removal

On such dates and times mutually agreed upon by the parties, the AGENCY will deliver all vehicles to an AXON Installer which will remove from said vehicles all components of the existing mobile video camera system unless otherwise agreed upon by the AGENCY.

Major components will be salvaged by the AXON Installer for auction by the AGENCY. Wires and cables are ~~not~~ considered expendable and will not be salvaged. Salvaged components will be placed in a designated area by the AGENCY within close proximity of the vehicle in an accessible work space.

Prior to removing the existing mobile video camera systems, it is both the responsibility of the AGENCY and the AXON Installer to test the vehicle's systems' operation to identify and operate, documenting any existing component or system failures and in detail, identify which components of the existing mobile video camera system will be removed by the AXON Installer.

In-Car Hardware/Software Delivery and Installation

On such dates and times mutually agreed upon by the parties, the AGENCY will deliver all vehicles to an AXON Installer, who will install and configure in each vehicle in accordance with the specifications detailed in the system's installation manual and its relevant addendum(s). Applicable in-car hardware will be installed and configured as defined and validated by the AGENCY during the pre-deployment discovery process.

If a specified vehicle is unavailable on the date and time agreed upon by the parties, AGENCY will provide a similar vehicle for the installation process. Delays due to a vehicle, or substitute vehicle, not being available at agreed upon dates and times may results in additional fees to the AGENCY. If the AXON Installer determines that a vehicle is not properly prepared for installation ("Not Fleet Ready"), such as a battery not being properly charged or properly up-fit for in-service, field operations, the issue shall be reported immediately to the AGENCY for resolution and a date and time for the future installation shall be agreed upon by the parties.

Upon completion of installation and configuration, AXON will systematically test all installed and configured in-car hardware and software to ensure that ALL functions of the hardware and software are fully operational and that any deficiencies are corrected unless otherwise agreed upon by the AGENCY, installation, configuration, test and the correct of any deficiencies will be completed in each vehicle accepted for installation.

Prior to installing the Axon Fleet camera systems, it is both the responsibility of the AGENCY and the AXON Installer to test the vehicle's existing systems' operation to identify, document any existing component or vehicle systems' failures. Prior to any vehicle up-fitting the AXON Installer will introduce the system's components, basic functions, integrations and systems overview along with reference to AXON approved, AGENCY manuals, guides, portals and videos. It is both the responsibility of the AGENCY and the AXON Installer to agree on placement of each components, the antenna(s), integration recording trigger sources and customer preferred power, ground and ignition sources prior to permanent or temporary installation of an Axon Fleet camera solution in each vehicle type. Agreed placement will be documented by the AXON Installer.

AXON welcomes up to 5 persons per system operation training session per day, and unless otherwise agreed upon by the AGENCY, the first vehicle will be used for an installation training demonstration. The second vehicle will be used for an assisted installation training demonstration. The installation training session is customary to any AXON Fleet installation service regardless of who performs the continued Axon Fleet system installations.

The customary training session does not ‘certify’ a non-AXON Installer, customer-employed Installer or customer 3rd party Installer, since the AXON Fleet products does not offer an Installer certification program. Any work performed by non-AXON Installer, customer-employed Installer or customer 3rd party Installer is not warrantied by AXON, and AXON is not liable for any damage to the vehicle and its existing systems and AXON Fleet hardware.

Overview

Project Name
Sewer Pipeline Inspection Camera

Total Requested
$57,615.00
(amount based on the Itemized Budget total)

Applicant Project Priority
Medium

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
jmoore@mt-pleasant.org

Applicant Email
Jason Moore

Organization
City of MtPleasant

Address
320 W Broadway St
MOUNT PLEASANT , 48858

Phone Number
9897795405

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Environmental
- Infrastructure

Project Description

This request is for the purchase of a new sewer camera for completing routine and emergency pipeline inspections.

Benefit Description

Regular inspections and assessments are essential for effectively prioritizing capital projects concerning the city's sanitary and storm sewer collection systems. Without direct visibility into the condition of the pipes, we must resort to less accurate indicators, such as pipe age and material.

During emergencies, the pipeline inspection camera proves invaluable and saves time in identifying issues. This proactive approach protects properties from potential flood damage by enabling timely resolution before sewer backups exacerbate the situation.

The initial support from SCIT in procuring our first sewer camera for pipeline inspections in 2004 was instrumental. Since then, we have used the system extensively to evaluate miles of sewer pipe and deployed it in numerous emergency situations. However, with the current equipment demanding significant upkeep and lagging behind advancements in technology, it is necessary to upgrade to a new system.

Funding Requirements

Equipment maintenance will be managed within the motor pool operational budget.

Project Timeline

Not Entered

Budget Items

Name	Cost	Quantity	Total	Category
Sewer Camera and Required Accessories	$57,615.00	1	$57,615.00	Infrastructure
AmountRequested	**$57,615.00**			

Matching Funds

Name	Cost	Quantity	Total
Sewer Camera and Required Accessories	$57,615.00	1	$57,615.00
AmountMatched	**$57,615.00**		

Budget Summary

Amount Requested

$57,615.00

Amount Matched

$57,615.00

Total Amount

$115,230.00

Uploaded Files

Name
SewerCameraQuote_2024-02-29.pdf

There are no comments to display.

Bell EQUIPMENT

Michigan
78 Northpointe Drive
Lake Orion, MI 48359
Phone: 248-370-0000
Fax: 248-370-0011

Ohio
1045 Taylor Rd.
Gahanna, OH 43230
Phone: 614-655-0022
Fax: 614-655-0022

ENVIROSIGHT ROVVER X PIPELINE HD INSPECTION SYSTEM
MIDEAL PRICING CONTRACT #071B7700091

- Rovver X Crawler with Wheels and HIGH-DEFINITION CAMERA
- (1) Integrated lift for lifting camera head out of flow in bigger pipe
- (1) Cable Reel with **1000 feet of cable**
- (1) RCX90 Pan & Tilt camera
- VC500 Pendant and Controller
- (1) Rear – View Camera with auxiliary LED for camera lift
- (4) Large Quick Change Grease Wheels
- (4) Medium Quick Change Grease Wheels
- (4) XXL Quick Change Rubber Wheels
- (1) Flexible Cable Guide Pulley for Manhole-Bottom
- (1) Manhole Roller
- Training and Delivery included
- **Price** **$115,230.00**

Available Options

1) Large Diameter Carriage – Large Diameter Pipe Carriage to Elevate Camera for 24" and Bigger $14,520.00

Bell EQUIPMENT

Michigan
78 Northpointe Drive
Lake Orion, MI 48359
Phone: 248-370-0000
Fax: 248-370-0011

Ohio
1045 Taylor Rd.
Gahanna, OH 43230
Phone: 614-655-0022
Fax: 614-655-0022

REFERENCES

City of Troy – Mike Schlegelmann or Andy Willetts		248-524-3497
City of Roseville	Brian Schulte	586-909-0396
City of St. Clair Shores	Bryan Babcok	586-445-5363
City of Warren	Gus Ghanam	586-574-4605
MDOT Detroit	Ryan Buhl	989-233-2182
City of Ferndale	Dan Harper	248-546-2514
Orion Township	Bill Basigow	248-391-0304

More provided upon request

Thank you for the Opportunity,

Steve Clelland
Bell Equipment Co.
248-770-5696
sclelland@bellequip.com

Bell EQUIPMENT

www.bellequip.com

Steve Clelland

Territory Equipment Manager

O. 248-370-0000 C. 248-770-5696

D. 248-370-0000 #1329

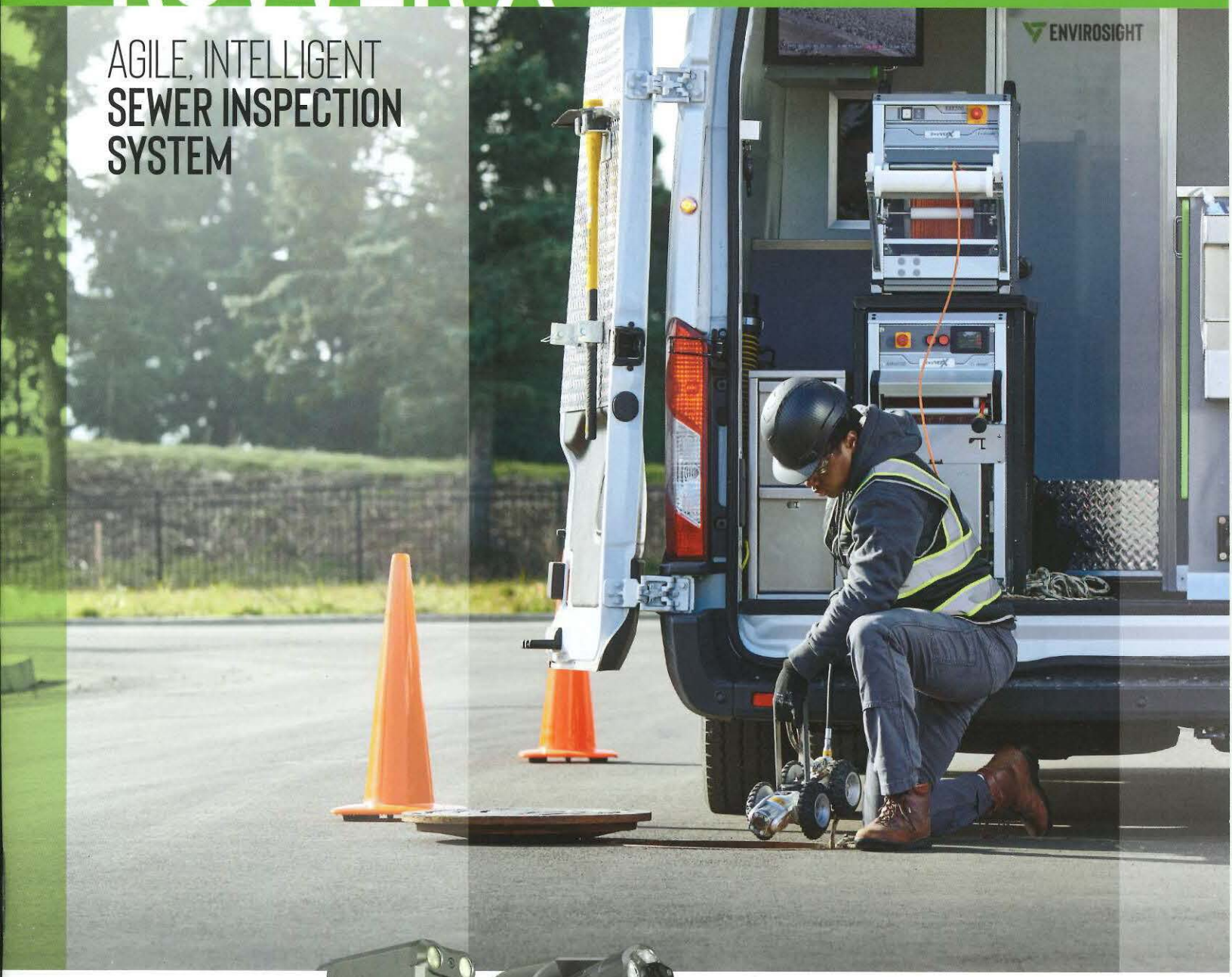
E. sclelland@bellequip.com

78 Northpointe Dr. |

Lake Orion, MI 48359

ROVVER X

AGILE, INTELLIGENT
SEWER INSPECTION SYSTEM



ENVIROSIGHT

GAIN DEEPER INSIGHT

When you open a manhole, be ready to get the full picture.

SIMPLE

Cut out complexity for your crew with technology that's easy to learn and use, a responsive support team, and a regional service network that delivers rapid turnaround.

RELIABLE

Stay on schedule and within budget with ROVVER X's industry-low downtime and cost-of-ownership. Not only is it built to endure punishment, its intuitive design lets you perform routine maintenance right in the field.

With unmatched power and agility, ROVVER X delivers the insight you need to make critical maintenance decisions. It offers industry-leading productivity with a simple interface, advanced capabilities and support for digital workflows.

ADAPTABLE

Tackle any inspection challenge. ROVVER X accessories and wheels swap in seconds to fit any pipe size, material and condition. And when the job calls for specialized capabilities, easily add lateral launch, laser profiling, side scanning and more.

AGILE

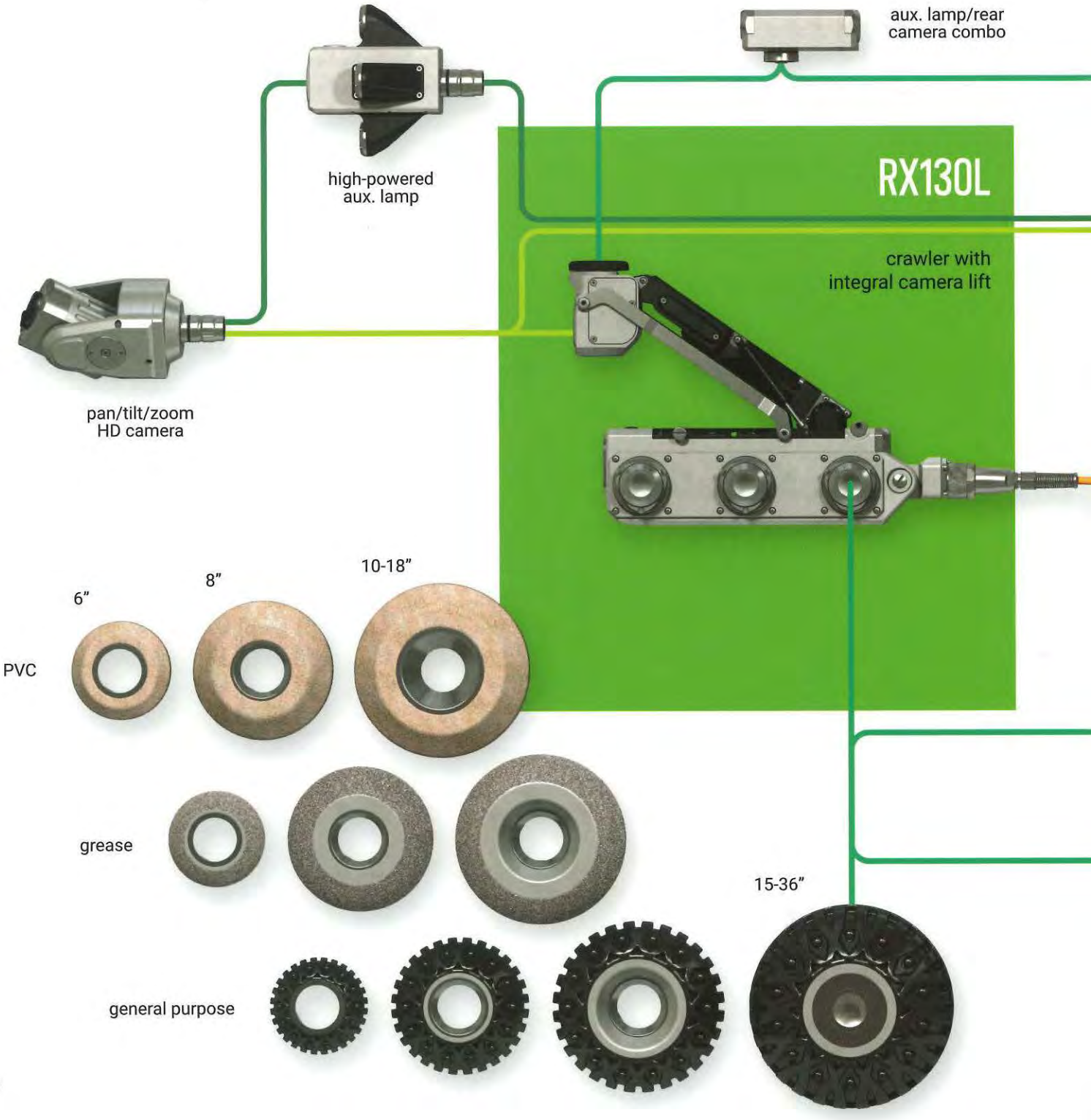
Power past obstacles that sideline other crawlers. With steerable six-wheel drive, ROVVER X avoids obstructions and climbs over debris and offsets. An array of onboard sensors helps you avoid hazards.

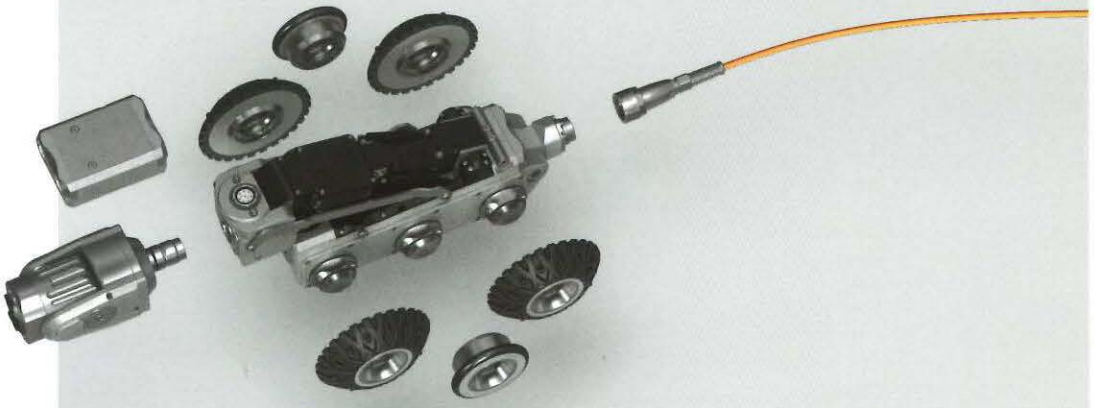
SMART

Access every capability from a single interface—operate the crawler, record video, overlay text, log observations, measure defects and create reports. Inspection data streams securely to the cloud, and the system auto-updates to the latest features.

ADAPTABLE

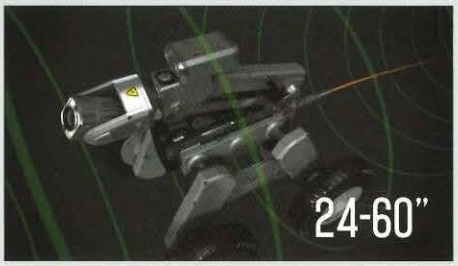
ROVVER X is the only crawler system that lets you change wheels and accessories rapidly without tools. Achieve new levels of productivity, and confidently handle any combination of pipe size, material and condition.



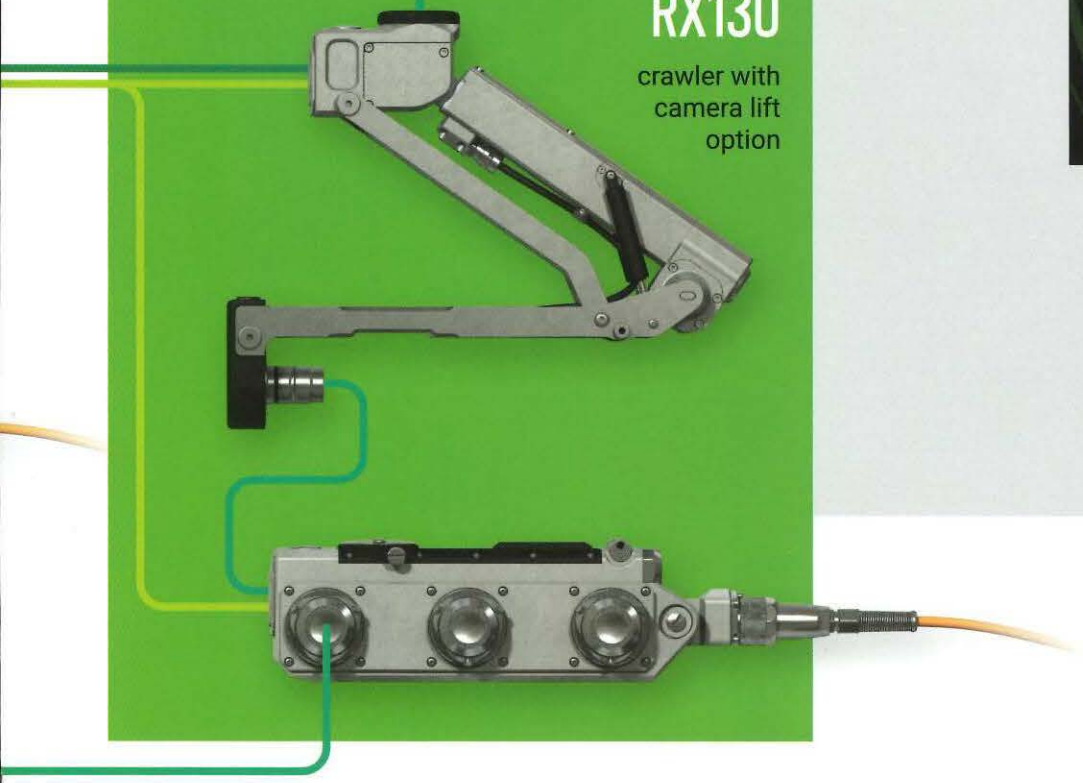


RX130

crawler with camera lift option

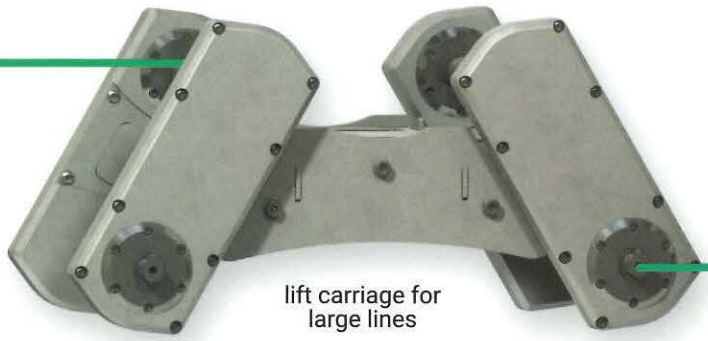


Scan to see ROVVER X’s quick-change capabilities in action.



24-36”

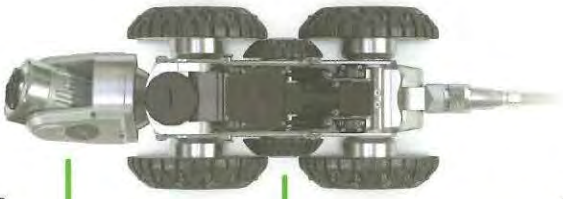
30” and up



lift carriage for large lines

SMART

Simple to learn yet powerfully capable, ROVVER X's touchscreen controls support your entire inspection workflow. And with built-in Wi-Fi, you can share inspections online and keep your ROVVER X system updated with the latest features.



Flexspection only available on VC500 HD controller.

FLEXSPECTION

Sometimes you need maximum detail, sometimes you need minimum file size—and sometimes you need a compromise. With Flexspection, the choice is yours.

SD | HD 720P | HD 1080P

NEED LESS?

This remote control puts all major crawler and reel functions in the palm of your hand, and it comes standard with every ROVVER X system.

NEED EVEN MORE?

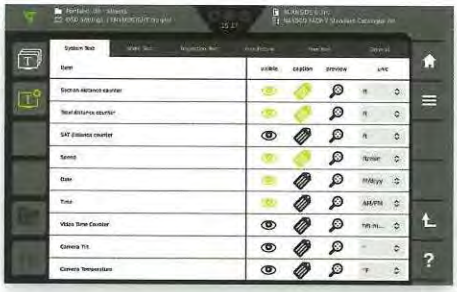
For maximum productivity, this optional desktop command center offers precision control, full QWERTY keyboard, and ergonomic comfort.

OPERATE

Control every ROVVER X function using twin multi-function joysticks, intuitive touchscreen controls and real-time feedback. Onscreen notifications help warn against operating hazards.

OVERLAY TEXT

With drag-and-drop simplicity, create an overlay that has static text, live data, observation details and your logo. Customize text position, color and background to your preference.



MEASURE DEFECTS

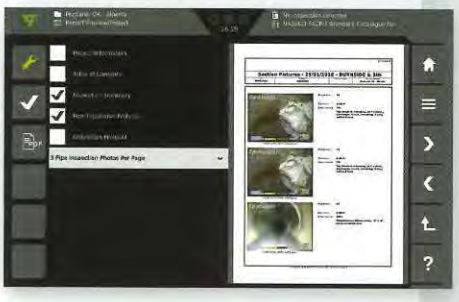
Powerful measurement tools let you size up cracks, water level, pipe diameter, wall features, bend angles, inclination and much more.

ENTER OBSERVATIONS

Create an inspection, then log observations with help from onboard defect catalogs, including PACP and WRc.

CREATE REPORTS

Generate PDF reports from completed inspections, then deliver them via USB drive.



CONNECTED

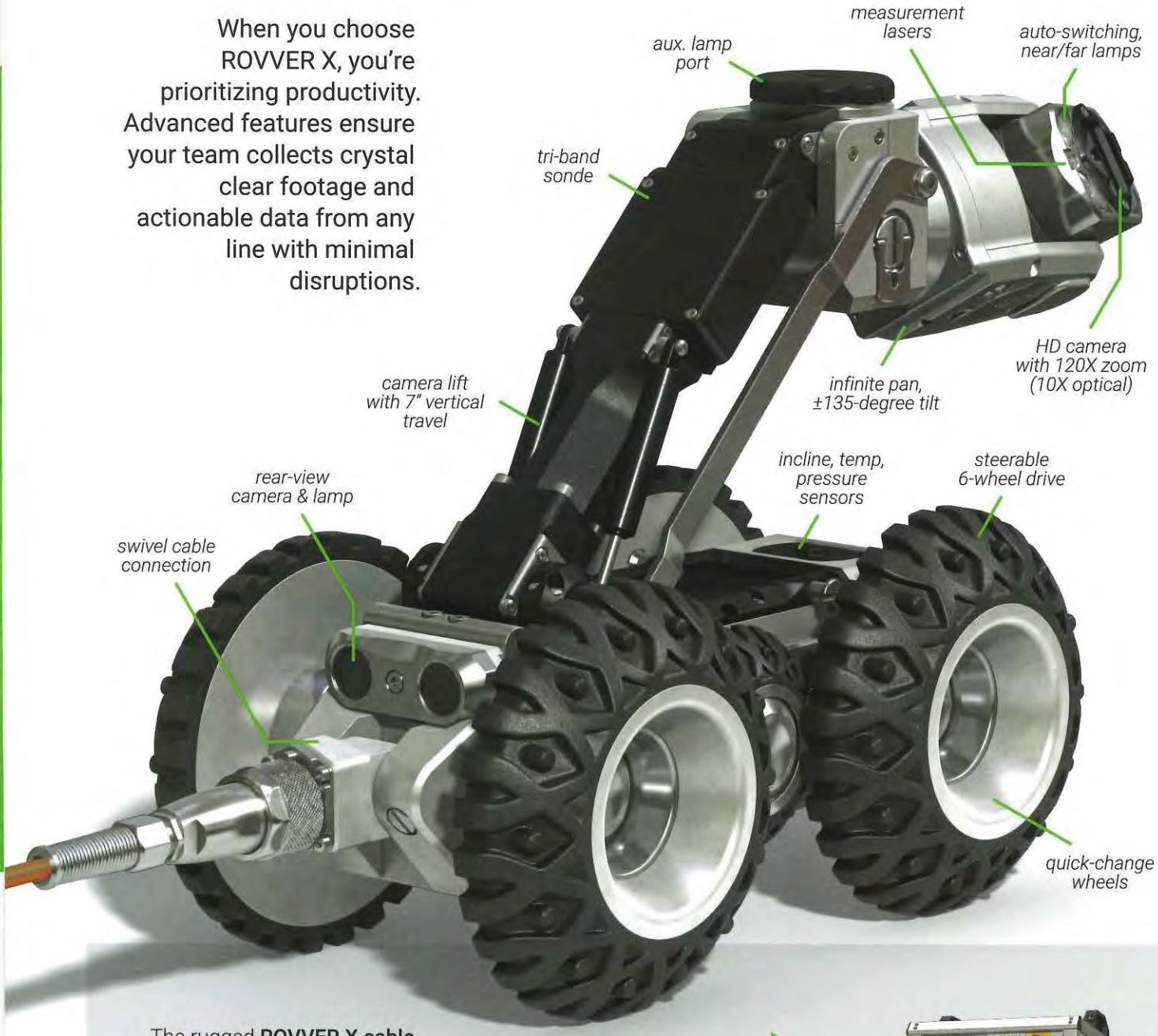
Wirelessly upload your inspections directly to WinCan Web, the cloud platform for sewer inspection data. Review, edit, analyze and map inspection data online, and securely share results with your entire team.

WinCan Web

Scan to set up your free WinCan Web trial account:

CAPABLE

When you choose ROVVER X, you're prioritizing productivity. Advanced features ensure your team collects crystal clear footage and actionable data from any line with minimal disruptions.



The rugged **ROVVER X cable** boasts a 1000-lb break strength. And with just 6 conductors, it's easy to field-reterminate.

Available in 984' and 1640' versions, the **ROVVER X reel** automatically feeds cable so the crawler doesn't have to pull it off the reel. This extends travel range and reduces crawler wear-and-tear.

SCALABLE

Once you own the ROVVER X platform, the sky is the limit. Specialty crawlers and attachments give you plug-and-play capability, so you can meet any inspection challenge.

SMALL DIAMETER

The ROVVER X 95 crawler fits into relined 4" pipe to inspect laterals and industrial lines.

LATERAL LAUNCH

SAT II lets you crawl up to 984' into mains and then launch 147' into lateral lines to locate cross bores and illicit flows.

LASER SCANNING

Measure pipe ovality, erosion and defects—ROVVER X's laser profiling attachment captures accurate geometry.

SIDE SCANNING

Using the Digisewer camera head, capture a sewer side-scan with detail from every square inch of pipe wall.

EXTRA-LARGE DIAMETER

The ROVVER X 400 crawler is ideal for interceptors and trunk lines, and has an integral camera lift to rise above high flows.

Consult sales representative for ideal setup and compatibility.

MOBILE

Stay safe, productive and comfortable while deploying your ROVVER X in the field. Envirosight-built vehicles protect your crew and offer full amenities—ensuring your equipment, tools, and safety gear are within easy reach.

PANEL VANS

Fit into alleys and other tight spaces while deploying ROVVER X or lateral launch. Choose among Sprinter, Transit and ProMaster options, with power from an inverter or vehicle PTO.

Power options include generator (gas or diesel), inverter with battery, or engine PTO.

BOX TRUCKS

Get maximum elbow room, plus extra capacity for lateral launch systems, generator power sources and cranes.

TRAILERS

Gain flexibility when inspection is part time or when inspection equipment must be shared between crews.

ENCLOSURES

Deploy an Envirosight Outpost when you need access to easements and other remote worksites using a pickup or ATV.

TRUSTED

Standing behind ROVVER X is a team with decades of experience helping sewer professionals succeed. We've built the industry's largest network of regional support and service locations—so wherever the job takes you, help is never far.

Don't take our word for it. Some of the largest cities and contractors trust ROVVER X. Scan to read their stories.

LOCAL PRESENCE

Success in our industry is a ground game. That's why we have systems, parts inventory and capabilities strategically deployed nationwide, ready for you on demand.

WARRANTY

ROVVER X is backed by one of the industry's most comprehensive warranties. Optional maintenance plans and extended warranties offer further cost predictability. And with more than 25 factory-certified service centers across North America, we're never far when you need help.

TRAINING

Your operators will be productive out of the gate with on-site training from certified ROVVER X instructors. Not only do we cover equipment care, operation and safety, we're available to provide PACP training, too. Need virtual training? We deliver it on demand from a fully equipped studio.

TURNAROUND

Gain access to our comprehensive online parts portal, where in-stock orders placed before 3:00 pm ship the same day, with next-day delivery available. And when unique challenges require unique capabilities, know that rental gear is available from 23 locations across the continent.

5000+
crawler systems worldwide

46
locations in North America

4%
average yearly cost of ownership
compared to purchase price

4000'+
average distance inspected per day
per crew

SPECIFICATIONS

system

ratings . . . . . CE, NRTL
power . . . . . 120-240 Vac, 60 Hz
viewing capability . . . . . pipelines 4–96" dia.
operating temp . . . . . 32 to 104°F
storage temp . . . . . -4 to 158°F

camera (RCX90 HD)

sensitivity . . . . . 0.05 lux
resolution . . . . . 1920 x 1080 pixels
zoom lens . . . . . 120x (10x optical, 12x digital)
pressure rating . . . . . 1 bar
protection class IP68
features . . . . . auto shutter; auto/manual focus
illumination . . . . . dimmable LED, dual mode
articulation . . . . . ±135 deg tilt; infinite pan
measurement . . . . twin laser diodes spaced 1.97"
sensing . . . . . temperature, pressure, pan/tilt
size . . . . . 6.6"x3.2"x2.8" (168x81x72 mm)
weight . . . . . 3.3 lb (1.5 kg)
materials . . . . . aluminum, stainless steel

crawler (RX130 HD, RX130L HD)

drivetrain . . . . . steerable 6-wheel drive
turn radius . . . . . down to 0.0"
camera . . . . . color rear-view with tri-LED lamp
sensors . . . . . pitch, roll, temperature, pressure
pressure rating . . . . . 1 bar
protection class IP68
size (130) . . . . 12.2"x4.3"x3.5" (310x110x90 mm)
size (130L) . . 15.1"x5.0"x4.6" (384x126x117 mm)
weight (130) . . . . . 13.2 lb (6 kg)
weight (130L) . . . . . 17.6 lb (8 kg)
lift range (130L) . . . . . 7.1" (180 mm)
materials . . . . . aluminum, stainless steel
sonde transmitter 33kHz/512Hz/640Hz

control pendant (VC500 HD)

controls . . . . . joysticks, touchscreen, power, stop
touchscreen . . . . . 10.1" color TFT, multi-touch,
. . 1280x800 px, 1280 cd/m², 150-deg view angle
video capture . . . . . MPEG-4 AVC (H.256)
image capture . . . . . JPEG or PNG
internal storage . . . . . 128 GB
connectivity . . . . LAN, USB 2, USB 3, Wi-Fi, HDMI
protection class IP55
size . . . . . 11.8"x10.5"x2.8" (300x267x71 mm)
weight . . . . . 4 lb (1.81 kg)
housing . . . . . plastic (ABS, PC), IP55-rated

auxiliary lamp (RAL200 HD, optional)

forward illumination . . . . . twin tri-LED lamps
camera . . . . . color rear-view with tri-LED lamp
sonde transmitter . . . . . 33 kHz / 512 Hz
protection class IP68
dims . . . . . 2.8"x1.3"x4.0" (72x33x102 mm)
weight . . . . . 1.3 lb (0.6 kg)
materials . . . . . aluminum, stainless steel

explosion-proof
models available

cable reel (RAX300 HD)

cable length . . . . . 984' (300 m)
cable diameter . . . . . ¼" (6.5 mm)
cable weight . . . . . 0.03 lb/ft
cable strength . . . . . 1000 lb
cable conductors 6
controls (local) . . . . . power, emergency stop
controls (via pendant) . . auto/manual, speed,
. . . . . forward/reverse, pull strength
sensors . . . . . tension, tilt
size . . . 24.6"x14.5"x22.6" (625x368x575 mm)
protection class IP44
weight . . . . . 123.4 lb (56 kg)
connections . . . . pendant, service, video in/out

camera lift (optional)

lift range . . . . . 7.1" (180 mm)
materials . . . . . aluminum, stainless steel

carriage (optional)

wheelbase (w/l) . . 14.5"/12.2" (368/310 mm)
weight . . . . . 34.2 lb (15.5 kg)
materials . . . . . aluminum, stainless steel

TYPICAL SYSTEM

- RX130 HD crawler body
- RCX90 HD camera head
- RAX300 HD reel with 984' cable
- VC500 HD control pendant
- WinCan VX software (basic)
- handheld wireless remote control
- assortment of wheels
- transport case(s)
- tools

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Overview

Project Name
Asphalt Overlays and Street Resurfacing

Total Requested
$620,586.80
(amount based on the Itemized Budget total)

Applicant Project Priority
Medium

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
jmoore@mt-pleasant.org

Applicant Email
Jason Moore

Organization
City of MtPleasant

Address
320 W Broadway St
MOUNT PLEASANT , 48858

Phone Number
9897795405

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Infrastructure
- Transportation

Project Description

Each year, the City’s Engineering Department completes an evaluation of all streets within the City limits. This evaluation determines the maintenance needed to restore the streets to a good quality surface. Many streets require preventative maintenance to improve their condition and prevent further deterioration. If the streets are left unattended, they will eventually need to be reconstructed. For every mile of street that must be reconstructed, nearly nine miles can be overlaid for the same cost. With a 2% contribution by the Saginaw Chippewa Indian Tribe, the City's overlay program can continue into the future.

Benefit Description

The City's overlay program allows us to stay on top of maintenance in our street system. Overlays are one of the more cost-effective treatments in the "mix of fixes" that we use and being able to fund the program fully means that we can incorporate full reconstructs into our capital improvement plan as the need arises. Any funding provided helps ensure that our street maintenance program continues at a sustainable pace.

With the reduction in population accounted for in the 2020 census the city’s road maintenance funding has decreased significantly. Overlays will be even more important to accomplish with this decrease in funding.

Funding Requirements

The City's overlay program is ongoing with projects of various size and location happening normally every year.

Project Timeline

Not Entered

Budget Items

Name	Cost	Quantity	Total	Category
Major Street Overlays	$206,310.00	1	$206,310.00	Transportation
Local Street Overlays	$414,276.80	1	$414,276.80	Transportation
AmountRequested	**$620,586.80**			

Matching Funds

Name	Cost	Quantity	Total
No Matching Funds items have been added.			
AmountMatched	**$0.00**		

Budget Summary

Amount Requested

$620,586.80

Amount Matched

$0.00

Total Amount

$620,586.80

Uploaded Files

Name
Listofstreetstobeoverlayedin2024_2024-02-29.docx

There are no comments to display.

List of streets to be overlayed in 2024

Locals

Adams: Broadway to Pickard
Arnold: Illinois to Broadway
Elm: Bradley to Henry
Edgewood: Broomfield to Deming
Deming: Broomfield to Edgewood
May: Watson to Sansote

Majors

Brown: Broadway to Pickard
Broadway Bridge Deck

Overview

Project Name
Pickard Storm Sewer

Total Requested
$247,780.00
(amount based on the Itemized Budget total)

Applicant Project Priority
High

Reocurring Need?
Not Reocurring

Applicant Information

Applicant Name
jmoore@mt-pleasant.org

Applicant Email
Jason Moore

Organization
City of MtPleasant

Address
320 W Broadway St
MOUNT PLEASANT , 48858

Phone Number
9897795405

Organization Information

Primary Organization
City of Mt. Pleasant

Authorizers
adesentz@mt-pleasant.org

Status
Review

Address
320 W. Broadway
Mount Pleasant, Michigan 48858

Phone
(989) 779-5300

Fax

Categories

- Infrastructure

Project Description

This request is for funding to upsize large-diameter storm sewer structures at the Pickard and Brown Street intersection. A large trunk line storm sewer that serves much of the east side of the City of Mt. Pleasant runs down Brown Street and crosses Pickard Street. Based on the analysis provided by the Multi-Jurisdictional Stormwater Master Plan that was accomplished with a previous two-percent grant, this trunk line sewer will need upgrading to provide adequate service to the upstream areas.

MDOT has begun reconstructing Pickard Street and will be finishing in 2024. Incorporating storm work into the project at that time will save significant costs associated with traffic control and contractor mobilization. The engineering consultant has incorporated the upsizing into the plans and MDOT is prepared to do the work if provided funding from the City.

Benefit Description

This project will allow for future upgrades to the stormwater collection system in order to meet the demands of future storm events.

Funding Requirements

Future funding requirements for operations and maintenance of the stormwater infrastructure are roughly equal to that of the current infrastructure.

Project Timeline

Summer 2024

Budget Items

Name	Cost	Quantity	Total	Category
Work Items	$222,780.00	1	$222,780.00	Infrastructure
Mobilization	$20,000.00	1	$20,000.00	Infrastructure
Traffic Control	$5,000.00	1	$5,000.00	Infrastructure
AmountRequested	**$247,780.00**			

Matching Funds

Name	Cost	Quantity	Total
Work Items	$242,780.00	1	$242,780.00
Mobilization	$20,000.00	1	$20,000.00
Traffic Control	$5,000.00	1	$5,000.00
Prior 2% Award	$20,000.00	1	$20,000.00
AmountMatched	**$287,780.00**		

Budget Summary

Amount Requested

$247,780.00

Amount Matched

$287,780.00

Total Amount

$535,560.00

Uploaded Files

Name
No files have been uploaded.

There are no comments to display.

DIVISION OF PUBLIC SAFETY
CITY OF MT. PLEASANT

804 E. High Street, Mount Pleasant, MI 48858
Phone: (989) 779-5100 Fax: (989) 773-4020

MEMORANDUM

DATE: March 18, 2024

TO: Aaron Desentz, City Manager

FROM: Paul Lauria, Director of Public Safety

SUBJECT: Natural Planned Landscape Draft Ordinance

Attached to this memorandum is the draft ordinance on Natural Planned Landscape. I took points from the City Commission's Work Session and provided them to the City Attorney, Mike Homier. Mr. Homier and his team provided this as a first draft.

During the Work Session, I would like to discuss each section of the draft ordinance line by line to make sure we are capturing what the City Commission intends. Once complete, I will resubmit the changes to Mr. Homier for a final draft of the ordinance for the Commission to consider for approval.

CITY OF MOUNT PLEASANT
ISABELLA COUNTY

ORDINANCE NO. _____

AN ORDINANCE TO REGULATE LANDSCAPES

It is hereby ordained by the People of the City of Mount Pleasant:

Section 1. **Purpose and Findings.** A variety of landscapes adds diversity and richness to the quality of life in the City. There are, nonetheless, reasonable expectations regarding the City's landscapes which, if not met, may decrease the value of nearby properties, degrade the natural environment, or threaten the public health, safety, and welfare. It is therefore in the public's interest to provide standards for the development and maintenance of the City's landscapes.

The City recognizes a landowner's interest in having managed turf grass landscapes. At the same time, the City encourages the preservation, restoration, and management of native plant in managed landscapes is economical, reduces maintenance and effectively conserves water, soil, and other elements of the natural environment. Moreover, the preservation, restoration, and management of native plant communities and wildlife habitats may preclude the introduction of toxic pesticides, herbicides, fertilizers, and other pollutants into the environment.

Section 2. **Definitions.** The following words and phrases, when used in this Ordinance, shall have the following meanings:

Cultivate means to grow or maintain vegetation.

Harmful Vegetation means any and all vegetation that in any way becomes a hazard to or detrimental to the health of any person.

Invasive Species means any vegetation that is not a native plant and whose introduction causes harm, or is likely to cause harm to Michigan's economy, environment, or human health.

Maintain means to keep in existence.

Keep in a particular state or condition, taking the necessary actions to prevent deterioration

Maintenance means to take actions or processes involved in keeping something in good condition

Native Plants means those plants identified as native plant species in southern Lower Michigan by Michigan State University Native Plants and Ecosystem Services, a copy of which shall be made available upon request.

Noxious Weeds means Canada thistle, dodders, mustards, wild carrot, bindweeds, perennial sowthistle, hoary alyssum, ragweed, poison ivy, goldenrod, quack-grass, poison sumac, or any other plants that are recognized as inducing hay fever, rose fever or other diseases, or as being in any way deleterious to the health or comfort of the community. This Ordinance does not apply to weeds in fields devoted to growing any small grain crop such as soybeans, wheat, oats, barley, or rye.

Planned Natural Landscaping means a planned, intentional and maintained landscaping of native plants, ornamental grasses and groundcovers, rain gardens, shrubs and trees.

Right of Way means any street, road, sidewalk, alley, driveway, or similar path by or upon which pedestrians or vehicles travel.

Weeds means all weeds, grass, brush, wildings, second growth, rank vegetation or other vegetation that is not growing in its proper place, having a greater height than seven inches or a spread of more than seven inches.

Section 3. Regulations.

A. It is unlawful for any person to cultivate any planned natural landscaping at a height greater than 12 inches in any right of way.

B. It is unlawful for any person to cultivate any planned natural landscaping in a manner which obstructs vision for any person traveling through or in any right of way.

C. It is unlawful for any person to cultivate any planned natural landscaping within 12 inches of the front yard property line.

D. It is unlawful for any person to cultivate any planned natural landscaping which crosses over any property lines.

E. It is unlawful for any person to cultivate any harmful vegetation, noxious weeds, or invasive species of vegetation within planned natural landscaping.

Section 4. Exceptions. The following are exceptions to the regulations of Section 3, except that there are no exceptions to Subsection 3(B):

A. The area in violation is a natural or unlandscaped area;

B. The area in violation is actively used as agricultural land;

C. The area in violation is part of a residential housing plat under development or land under development for sale by lot for building residential housing; or

D. The area in violation is a wetland as that term is defined in the State Natural Resources and Environmental Protection Act, Public Act 451 of 1994, being MCL §§ 324.101 et seq.

Section 5. **Duty to Remove.** It is the duty of every owner, occupant, or person having charge of any land within the City to cut down or cause to be cut down and destroyed all vegetation in violation of this Ordinance prior to May 1, June 1, July 1, August 1, and September 1 in each year and/or as needed and as often as may be necessary to comply with this Ordinance.

Section 6. **Notice of Violation by City.** The City may issue written notice to the owner, occupant, or person having charge of any land within the City that is in violation of this Ordinance. Such notice shall provide the owner, occupant, or person having charge of the land with 10 days to bring the land into compliance with this Ordinance.

Section 7. **Removal by City.**

A. If the owner, occupant, or person having charge of any land within the City refuses to remove vegetation after receiving notice under Section 6, then the City or its authorized agent may enter upon the land and cut down or cause to be cut down and destroyed all vegetation in violation of this Ordinance.

B. Any expense related to the removal of vegetation pursuant to Subsection 7(A) will be billed to the owner, occupant, or person having charge of the land.

C. If any person billed for the removal of vegetation pursuant to Subsection 7(B) has not paid for the removal after 30 days from billing, the City has the right place a lien on the property to secure the collection of the expense.

D. Any vegetation that is damaged, altered, or destroyed by the City in the natural course of City maintenance, such as snow plowing, is not the responsibility of the City to replace or to compensate for.

Section 8. **Penalty.** Any person violating this Ordinance shall be held responsible for a municipal civil infraction and prosecuted in accordance with the Municipal Civil Infractions Ordinance. The fine for violation of a municipal civil infraction under this Ordinance shall be $50; the second violation, $100; and the third or any subsequent violation within any one calendar year, $250.

Section 9. **Repealer.** This Ordinance expressly repeals all township ordinances and parts of ordinances in conflict with this Ordinance.

Section 10. **Severability.** If any provision of this Ordinance is declared invalid for any reason, that declaration does not affect the validity of all other sections of this Ordinance.

Section 11. **Effective Date.** This Ordinance takes effect 30 days after its adoption.