SCS ENGINEERS

Transmittal

West Des Moines, IA

PROJECT:	GRRWA,2025 LF Permit Renewal,IA 27225270.00	DATE:	11/20/2025
SUBJECT:	GRRWA Permit Renewal and Design Modifications 56-SDP-07-80P 11.19.2025 Final	TRANSMITTAL ID:	00002
PURPOSE:	For Record	VIA:	Info Exchange

FROM

NAME	COMPANY	EMAIL	PHONE
Kasi Province West Des Moines, IA	SCS Engineers	KProvince@scsengineers.com	

TO

NAME	COMPANY	EMAIL	PHONE
Mike Smith 502 East 9th Street Des Moines IA 50319-0034 United States	Iowa, State of	mike.smith@dnr.iowa.gov	515-725-8200
Becky Jolly		becky.jolly@dnr.iowa.gov	

REMARKS:

Mike and Becky,

Regarding my recent communication this morning, please see the correct version of the Great River Regional Waste Authority 2025 Permit Renewal and Design Modifications document. This version includes Timothy C. Buelow's Professional Engineering stamp.

Let me know if you have questions or need clarifications.
Thank you,

Kasi Province, P.E.
Project Professional
SCS Engineers
kprovince@scsengineers.com

www.scsengineers.com

DESCRIPTION OF CONTENTS

QTY	DATED	TITLE	NOTES
1	11/20/2025	GRRWA Permit Renewal and Design Modifications 56-SDP-07-80P 11.19.2025 v1.0.pdf	

Transmittal

DATE: 11/20/2025
TRANSMITTAL ID: 00002

COPIES:

Austin Banks	(Great River Regional Waste Authority, IA)
Tim Buelow	(SCS Engineers)
Christine Collier	(SCS Engineers)

November 19, 2025
File No. 27225270.00

Mr. Mike Smith
Iowa Department of Natural Resources
Land Quality Bureau
6200 Park Avenue, Suite 200
Des Moines, Iowa 50321

Subject: 2025 Permit Renewal Application and Design Modifications
Great River Regional Waste Authority Sanitary Landfill
Permit No. 56-SDP-07-80

Dear Mr. Smith:

On behalf of the Great River Regional Waste Authority (Authority), SCS Engineers is pleased to submit this Permit Application for the Great River Regional Waste Authority Sanitary Landfill (Landfill). Included in the application are design modifications to the Landfill. Details can be found in the Executive Summary Section 2.4 New Permit Amendment Request and Appendix C of this document.

Following standard practice, the permittee and SCS have reviewed the current permit and planning documents. Form 50 for permit renewal applications has been completed. Section 1 has been reviewed and updated. Section 2 has been prepared as required with the Executive Summary. Refenced documents are either included in this submittal if updates occurred or the DocDNA number of the current approved plans has been included. Upon review of this documentation and attachments, the Authority representative has provided signature in Section 3.

Please feel free to contact us if you have any questions, require additional information, or need any further clarification.

Sincerely,

Kasi Province, P.E.
Project Professional
SCS Engineers

Timothy C. Buelow, P.E.
Senior Project Advisor
SCS Engineers

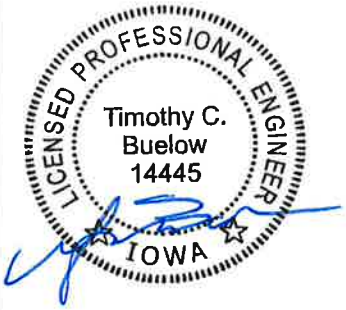
KDP/CLC/TCB

cc: Austin Banks, General Manager, Great River Regional Waste Authority

2025 Permit Renewal Application Great River Regional Waste Authority (GRRWA) Sanitary Landfill

Prepared For:
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, IA 52627

Permit No. 56-SDP-07-80



I hereby certify that this document was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the state of Iowa.

11/19/2025
Date

Timothy C. Buelow, P.E.
License No. 14445
My license renewal date is: December 31, 2025
Pages or sheets covered by this seal:
DNR Permit Application Form 50 and Appendix C.

SCS ENGINEERS

Project No. 27225270.00 | November 2025

1690 All-State Court, Suite 100
West Des Moines, IA 50265
515-631-6160

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Appendices

1.0 IOWA DEPARTMENT OF NATURAL RESOURCES FORM 50

IOWA DEPARTMENT OF NATURAL RESOURCES

Municipal Solid Waste Landfill

PERMIT APPLICATION FORM 50

☐ **New Permit**

☒ **Permit Renewal (permit number)** 56 **- SDP -** 07 **-** 80 **MLF**

☐ **Closure Permit**

SECTION 1: PERMIT APPLICATION REQUIREMENTS

Owner of site

Name: Great River Regional Waste Authority Phone: (319) 372-6140

Address: 2092 303rd Avenue Fax: (319) 372-6222

City, State, Zip: Fort Madison, Iowa 52627 E-mail: abanks@grrwa.com

Certified Operator Responsible for Operation at Facility

Name: Derek Hamm Phone: (319) 470-6221

Address: 2092 303rd Avenue Fax:

City, State, Zip: Fort Madison, Iowa 52627 E-mail: abanks@grrwa.com

Permit Applicant

Name: Great River Regional Waste Authority Phone: (319) 372-6140

Address: 2092 303rd Avenue Fax: (319) 372-6222

City, State, Zip: Fort Madison, Iowa 52627 E-mail: abanks@grrwa.com

Design Engineer (PE)

Name: Timothy C Buelow, P.E. Phone: (515) 631-6160

Address: 1690 All State Court, Suite 100 Fax:

City, State, Zip: West Des Moines, Iowa 50265 E-mail: tbuelow@scsengineers.com

Iowa Engineer License #: 14445 Expiration Date: 12/31/2025

Responsible Official for the Facility

Name: Austin Banks Phone: (319) 372-6140

Address: 2092 303rd Avenue Fax:

City, State, Zip: Fort Madison, Iowa 52627 E-mail: abanks@grrwa.com

Agency and Responsible Official of Agency Served (if any)

Name: Great River Regional Waste Authority Phone: (319) 372-6140

Address: 2092 303rd Avenue Fax: (319) 372-6222

City, State, Zip: Fort Madison, Iowa 52627 E-mail: abanks@grrwa.com

Facility

Name: GRRWA Sanitary Landfill

Address: 2092 303rd Avenue City, State, Zip: Fort Madison, Iowa 52627

Legal Description:

Portion of E 1/4 & N 1/4 of SE 1/4 of Section 28 & SW 1/4 of Section 27 & NW 1/4 of Section 34, T68N, R4W in Lee County, Iowa.

Landfill is part of the following solid waste comprehensive planning area:

Planning Area Name: Great River Regional Waste Authority

Date of Last Approved Plan: January 30, 2025

Service area of the landfill (include unincorporated areas and out of state generators):

The City of Hillsboro and the unincorporated area in Henry County; all cities and unincorporated area in Lee County; and all cities and the unincorporated area in Van Buren County.

Population Served: 47,222 (2022 Comp Plan)

SECTION 2: PERMIT APPLICATION SUPPORTING DOCUMENTATION

PLANS AND SPECIFICATIONS

Checking the appropriate boxes below certifies that the documents submitted in conjunction with this application form are complete and in compliance with the applicable chapters of the Iowa Administrative Code. While some of the documents below may have been submitted previously, updated copies of each are required to be provided with each permit renewal application, unless a prior document remains current and is identified by Doc ID#, Section, and Page.

Required Plans and Specifications

☒ Executive Summary

An executive summary shall address the following:

- Summary of modifications, if any, to the approved plans and specifications that occurred during the current permit cycle.
- Summary of each special provision of the current permit to determine if it is to remain the same, be revised or be removed.
- Provide documentation and certification as required for new permit amendment requests, if any.
- Provide documentation and certification as required for equivalency review requests, if any.
- Provide documentation and certification as required for new variance requests from Iowa Administrative Code requirements, if any.

☒ An organizational chart in accordance with Iowa Administrative Code 567 paragraph 113.5(1)"b".

No Revision Required - See Doc ID#, Section, and Page: _____

☐ A site exploration and characterization report for the facility that complies with the requirements of subrule 113.6(4).

No Revision Required - See Doc ID#, Section, and Page: DocDNA #47922, App. 2, pg. 28 & #96923, App. 4, pg. 29

☒ Design plans and specifications for the facility, and quality control and assurance plans, that comply with the requirements of rule 113.7(455B).

No Revision Required - See Doc ID#, Section, and Page: Specs*: DocDNA #96922, App. 2, pg 123 &

QCA Plans for New Cell: DocDNA #96922, App. 3, pg. 237 &

QCA Plans for Final: DocDNA #96923, App. 3, pg 1

*2025 Permit Renewal Application contains modifications to the plans and specifications.

☒ A development and operations (DOPS) plan for the facility, an emergency response and remedial action plan (ERRAP), and proof of MSWLF Operator Certification that comply with the requirements of rule 113.8(455B) .

No Revision Required - See Doc ID#, Section, and Page: DOPS: DocDNA #96925, App. 11, pg. 57

☐ An environmental monitoring plan that complies with the requirements of rules 113.9(455B) and 113.10(455B).

No Revision Required - See Doc ID#, Section, and Page: HMSP: DocDNA #96924, App. 9.A, pg 9 &

LGFP: DocDNA #96924, App. 9.B, pg 91

☐ The project goals and time lines, and other documentation as necessary to comply with subrule 113.4(10) and other requirements of the Department if an RD&D permit is being requested or renewed.

No Revision Required - See Doc ID#, Section, and Page: N/A

☒ Proof of financial assurance in compliance with rule 113.14(455B).

No Revision Required - See Doc ID#, Section, and Page: _____

☐ A closure and postclosure plan that complies with the requirements of rules 113.12(455B) and 113.13(455B).

No Revision Required - See Doc ID#, Section, and Page: DocDNA #96923, App. 7, pg 613 & DocDNA #96924, App. 8, pg 1

☒ Comprehensive plan requirements. Attach a copy of the most recent comprehensive plan approval or amendment letter.

No Revision Required - See Doc ID#, Section, and Page: _____

☐ Household Hazardous Materials (HHM) collection certification. If applicable, include a plan for HHM temporary collection and storage in accordance with IAC 567 Chapter 123 (455B, 455D, 455F).

No Revision Required - See Doc ID#, Section, and Page: N/A

In addition to the documents required above, the permit holder shall comply with the implementation plan requirements of subrule 113.2(9), the public notice requirements of subrule 113.4(12), and the record-keeping and reporting requirements of rule 113.11(455B). If the department finds the permit application information to be incomplete, the department shall notify the applicant of that fact and of the specific deficiencies. If the applicant fails to correct the noted deficiencies within 30 days, the department may reject the application and return the application materials to the applicant. The applicant may reapply without prejudice.

SECTION 3: APPLICANT SIGNATURE

Signature of Permit Applicant: _____ **Date:** 11-19-2025

Printed Name: Austin BANKS **Title:** General Manager.

Applications for sanitary disposal projects must be accompanied by the plans, specifications and additional information required by the applicable solid waste rules under Iowa Administrative Code.

Send completed applications with attached information to the DNR project officer via email or file sharing platform.

For questions concerning this application contact Brian Rath at 515-537-4051, brian.rath@dnr.iowa.gov

2.0 EXECUTIVE SUMMARY

2.1 INTRODUCTION

The information required in the Executive Summary for the Great River Regional Waste Authority (GRRWA) Sanitary Landfill (Landfill) permit renewal application is listed in Section 2.0 of the Permit Application Form 50 and includes a summary of modifications, special provisions, permit amendments, and documentation and certification as required for new permit amendment requests and new waiver requests.

2.2 SUMMARY OF MODIFICATIONS

Modifications to the current plans and specifications during the current permit cycle (September 11, 2020 to present) are summarized in Table 1.

Table 1. Permit Modifications History

Date	Permit Modification
08/26/2021	Permit Revision #1 incorporated DNR approval of the request to use whole shingles to construct a storage pad (Special Provision #13) and modify the engineering inspection requirements for the closed Phase 1 unit (Special Provision #XI. 17).
10/8/2021	Permit Revision #2 incorporated DNR approval of the Cell R3-1 construction certification report (Special Provision #3q), use of the cell for waste disposal (Special Provision #2a), and the addition of a groundwater underdrain monitoring point to the HMSP (Special Provision #4a)
1/26/2022	Permit Revision #3 removed reference to IAC 567 Chapters 20 through 31 in the general provisions, incorporated DNR approval of the Cell R3-1 construction certification report documenting completion of the sand drainage layer (Special Provision #3r), and updated the approved disposal areas (Special Provision #2a)
1/9/2023	Permit Revision #4 removed references to yard waste composting.
1/31/2023	Permit Revision #5 approved the 1st Tier Separatory Liner Construction Certification Report (Special Provisions #2a and 3s)
7/19/2023	Permit Revision #6 approved the 2nd Tier Separatory Liner Construction Certification Report (Special Provisions #2a and 3t) and modifications to leachate reporting for closed Phase 1 MSWLF unit (Special Provision XI.5.a)
4/10/2024	Permit Revision #7 approved design modifications to Cell R3-2 (Special Provision #3a)
6/10/2024	Permit Revision #8 removed three previously approved ADCs
7/29/2024	Permit Revision #9 approved Cell R3-2 for waste disposal (Special Provisions #2a and #3u), and modified the HMSP (Special Provision #4a)
7/7/2025	Permit Revision #10 approved the temporary storage of used railroad ties (Special Provision 2.g.) and approved the recirculation of leachate (Special Provision 4., subsequent provisions were renumbered)
10/27/2025	Permit Revision #11 recognized the Environmental Covenant for the Phase I MSWLF Unit and revised XI. Special Provisions – Closed Units.

2.3 SPECIAL PROVISIONS OF CURRENT PERMIT

Following is a summary of each special provision (Section X. Special Provisions) of the current permit in addition to a brief discussion of whether it is to remain the same, be revised, or be removed.

Special Provision #1.

The permit holder is authorized to accept solid waste for disposal in accordance with the approved Great River Regional Waste Authority Comprehensive Plan. The Comprehensive Plan as approved by the DNR on February 23, 2016; any approved amendments to the plan; and the latest plan update, are hereby incorporated as permit plan documents.

The permitted service area includes: The City of Hillsboro and the unincorporated area in Henry County; all cities and the unincorporated area in Lee County; and all cities and the unincorporated area in Van Buren County.

In accordance with subrule 101.13(2), the permit holder shall submit an updated Comprehensive Solid Waste Management Plan compliant with the DNR's schedule.

Please update to include that the Great River Regional Waste Authority has participated in the Environmental Management System (EMS) as an alternative to comprehensive planning since the approval on October 3, 2019 (Doc# 4099). The most recent EMS Annual Report was last approved on October 14, 2024 (DNR# 5015) and included in **Appendix A**.

Special Provision #2.

The permit holder shall develop and operate the site in accordance with the hereby approved Development and Operations Plan contained in Appendix 11-5 of the Request for Permit Amendment and Approval to Construct the 2019 North Lateral Expansion, and Application for Permit Renewal (docs #96921-#96925); dated January 31, 2020; and the August 4, 2020 response letter (doc #98194); as submitted by Barker Lemar Engineering Consultants/Evora Consulting; and the following:

a. *Waste disposal is limited to Phase 2, Region 1; Cells R2-1, R2-2 and R2-3 in Phase 2, Region 2; Cells R3-1 and R3-2 in Region 3, and the 1st and 2nd tiers of the R3-1 separatory liner as shown on Sheet 1 of document #105640 and Sheet 1 of document #107244. Any further expansion beyond these cells shall require prior DNR approval.*

b. *The permit holder is authorized to place wastes in the Phase 2 Municipal Solid Waste Landfill Management (MSWLF) unit to the top of waste elevations shown on Figure 2 in the Request to Modify Top of Waste Grades, dated July 5, 2018 (doc #92742), as amended by the August 24, 2018 submittal (doc#93049), both as submitted by Barker Lemar Engineering Consultants and approved on August 30, 2018.*

c. *Processing of waste in a shredder shall occur only within active MSWLF units and all liquids generated by waste shredding operations shall be managed as leachate. Materials reclaimed from waste shredding operations shall be containerized and covered as necessary to control odors, vectors and litter.*

d. *The permit holder shall collect leachate from the leachate control system and properly dispose of the leachate either by treatment in an on-site facility, discharge with an NPDES permit; or by discharge to the City of Fort Madison publicly owned treatment works (POTW). If the discharge is to a POTW with a pretreatment program approved by the DNR, the discharge must comply with the terms and conditions of a local permit issued for the discharge by the POTW. If the discharge is to a POTW without an approved pretreatment program a completed treatment agreement form shall be submitted to the DNR's Wastewater Section. Copies of the local permit or treatment agreement shall be provided to the DNR's Solid Waste Section and the local Field office. The treatment agreement must be on DNR Form 31 (542-3221) and must comply with the requirements of subrule 64.3(5).*

   In addition, the permit holder shall monthly measure leachate head levels and elevations at all piezometers and record the volume of leachate collected and transported to the treatment works. Records of leachate contaminants testing required by the treatment works and any NPDES permit for on-site treated leachate discharges shall be maintained.

   The permit holder shall annually submit a Leachate Control System Performance Evaluation (LCSPE) Report pursuant to subparagraph 113.7(5)"b"(14) as a supplement to the facility Annual Water Quality Report, as defined in subrule 113.10(10).

e. *The following shall be recorded by the permit holder and reported in the LCSPER for each leachate thickness measurement that equals or exceeds 12 inches:*

   1) *Date of original and any verification measurement.*

   2) *If 12 inch or greater leachate column is verified, specific actions taken by the certified operator to lower leachate thickness, or an explanation why specific actions were not necessary.*

   3) *Date and results of follow-up measurement.*

   4) *Repeat steps 2 and 3 as necessary until a compliant measurement is collected.*

f. *The permit holder shall follow the approved Emergency Response and Remedial Action Plan (ERRAP) procedures during all emergencies pursuant to subrule 113.8(5). An updated ERRAP shall be submitted at the time of each permit renewal application. An updated ERRAP shall be included with any request for permit modification to incorporate a facility expansion or significant changes in facility operation that require modification of the currently approved ERRAP.*

g. *The permit holder is approved to temporarily store approximately 70,000 used railroad ties within the limits of the fill area for up to July 2, 2027, by which time all railroad ties will have been disposed in the working face.*

An updated ERRAP is included in **Appendix B**. It is requested to incorporate the design modifications as discussed in Section 2.4, and as presented in **Appendix C** into this Special Provision. There are no other changes required or requested to Special Provision #2.

Special Provision #3.

The permit holder is authorized to construct the liner and leachate collection system in accordance with the plans and specifications and QC&A program contained in Appendices 2, 3, and 10 of the Request for Permit Amendment and Approval to Construct the 2019 North Lateral Expansion, and Application for Permit Renewal (docs #96921-#96925); dated January 31, 2020; and the August 4, 2020 response letter (doc #98194; includes design of an infiltration barrier layer and leachate collection system retrofit over Phase 2, Region 1 area); as submitted by Barker Lemar Engineering Consultants/Evora Consulting; and the following:

a. *The permit holder shall notify the DNR and have the site inspected when the construction of a new MSWLF unit or significant components thereof has been completed, in accordance with subrule 113.4(6). Prior to the inspection, the QC&A officer shall submit a final report to the DNR that verifies compliance with the requirements of rule 113.7 and the approved plans and specifications. No waste disposal shall commence in any newly constructed unit or portion thereof until it has been inspected and approved by the DNR.*

b. *The Construction Certification Report for Phase 2, Region 1 dated January 1993, as submitted by James M. Montgomery and approved on April 20, 1993; is incorporated into the permit.*

c. *The Leachate Lagoon Repair report (doc #64033) dated December 10, 1996, as submitted by Foth & Van Dyke; is incorporated into the permit.*

d. *The Liner Repair Activities report (doc #51772) dated June 25, 2002, as submitted by Barker Lemar Engineering Consultants; is incorporated into the permit.*

e. *The Leachate Extraction Well Installation As-Built construction certification report (doc #51737) dated January 5, 2004, as submitted by Barker Lemar Engineering Consultants related to the installation of a 36" diameter leachate extraction well in each of Phase 1 and Phase 2, Region 1 and approved on March 8, 2004, is incorporated into the permit.*

f. *The Revised Phase 2 Region 1 Leachate Seep Tie-In Line Design (doc #51709) dated May 4, 2005, as submitted by Barker Lemar Engineering Consultants and approved on June 20, 2005 is incorporated into the permit.*

g. *The Leachate Seep Tie-In Line of Segment A-1 Construction Certification Report (doc #51682) dated January 20, 2006, as submitted by Barker Lemar Engineering Consultants and approved on May 2, 2006; is incorporated into the permit.*

h. *The Construction Certification Report (doc #51683) dated February 27, 2006, regarding the construction documentation of replacement leachate piezometer LPZ-1R, as submitted by Barker Lemar Engineering Consultants and approved on May 2, 2006, is incorporated into the permit.*

i. *The Phase 1 and Phase 2, Region 1 Leachate Control System Repair Schedules letter (doc #6758), dated July 27, 2007 and submitted by Barker Lemar Engineering Consultants and approved on August 6, 2007 is incorporated into the permit.*

j. *The Phase 1 and Phase 2, Region 1 Leachate Control System Repairs plans (doc #9729), dated September 28, 2007, submitted by Barker Lemar Engineering Consultants and approved on October 12, 2007, is incorporated into the permit.*

k. *The Construction Certification Report for the Phase 0 Cell Construction and Closure Construction (doc #9124), dated September 20, 2007 and pertains to the disposal cell now referred to as Cell R2-1, submitted by Barker Lemar Engineering Consultants and approved on September 24, 2007, is incorporated into the permit.*

l. *The Construction Certification Report, Leachate Control System Repairs (doc #46075), dated July 31, 2009, as submitted by Barker Lemar Engineering Consultants and approved on August 21, 2014, is incorporated into the permit.*

m. *The Construction Observation Report, Cell R2-2 Construction (doc #60337), dated August 24, 2010 and submitted by Barker Lemar Engineering Consultants, and approved on August 27, 2010, is incorporated into the permit.*

n. *The Construction Observation Report – Cell R2-3 Construction (doc #73291), dated July 9, 2012; the sand permeability test results (doc #73096), dated July 11, 2012; and the Attachment D field density test location maps (doc #73292), received via email July 16, 2012; all submitted by Barker Lemar Engineering Consultants and approved on July 17, 2012; are incorporated into the permit.*

o. *The Construction Observation Report – Leachate Extraction System Improvements (doc #84562); dated October 29, 2015; as submitted by Barker Lemar Engineering Consultants and approved on November 9, 2015 is incorporated into the permit. The report documented the installation of leachate extraction wells LEW-7, LEW-8, LEW-9, LEW-10 and LEW-11; and leachate piezometers LPZ-6 and LPZ-7 in the Phase 2 Region 1 fill area.*

p. *The Leachate Toe-Drain Notification report (doc #97832), dated May 29, 2020, as submitted by Barker Lemar Engineering Consultants, is incorporated into the permit. The report documented the construction of a toe drain to correct a persistent leachate seep along the south side of the Phase 2 MSWLF unit.*

q. *The Construction Observation Report – Cell R3-1 (doc #101368), dated October 7, 2021 as submitted by Evora Consulting; was approved on October 8, 2021 and is incorporated into the permit.*

r. *The Construction Observation Report – Cell R3-1 Drainage Layer Sand Verification (doc #102135), dated January 24, 2022 as submitted by Evora Consulting, and documenting construction completion of the sand drainage layer; was approved on January 26, 2022 and is incorporated into the permit.*

s. *The 1st Tier of Separatory Liner Construction Observation Report (doc #105640) dated January 30, 2023 as submitted by Evora Consulting, and documenting construction completion of the 1.35 acre first tier of the Cell R3-1 separatory liner; was approved on January 31, 2023 and is incorporated into the permit.*

t. *The 2nd Tier of Separatory Liner Construction Observation Report (doc #107422) dated July 17, 2023 as submitted by SCS Engineers, and documenting construction completion of the 1.61-second tier of the Cell R3-1 separatory liner; was approved on July 19, 2023 and is incorporated into the permit.*

u. *The Construction Observation Report – Cell R3-2, dated July 25, 2024 as submitted by SCS Engineers, was approved on July 26, 2024 and is incorporated into the permit.*

Please update to include the changes requested in Section 2.5 New Permit Amendment Requests with this submittal.

Special Provision #4.

The permit holder is authorized to recirculate leachate in the Phase 2 Regions 2 and 3 and in the separatory liner area in Region 1 as requested, dated July 1, 2025 (Document No. 113339), as submitted by SCS Engineers, and the following:

a. *Leachate shall not be applied on user vehicle access areas. Leachate application shall be over areas with a minimum setback of 2:1 (horizontal:vertical) from the areas in Phase 2 Region 1 without a separatory liner. Such areas shall be designated in advance by placing stakes along the setback line.*

b. *Leachate shall not be applied to vegetated areas on final cover or frozen waste cover. A means of frost protection must be provided for all leachate control elements.*

c. *Leachate shall be applied evenly on the affected area.*

d. *Leachate recirculation shall be conducted only during hours of operation and when an operator is on duty.*

e. *Leachate shall be applied in a manner such that ponding or runoff will not occur.*

f. *Leachate recirculation shall be controlled such that not more than one foot of leachate head will be allowed to accumulate above the MSWLF unit liner.*

g. *Records shall be maintained as to the time and quantities of leachate application and be submitted with the facility LCSPER.*

h. *Leachate recirculation shall be immediately terminated if it causes ponding, runoff, excessive odor, vector control problems, vapor drift, ice formation, or operational problems. The DNR's local field office shall be immediately notified if any of the above events occur.*

There are no changes required or requested to Special Provision #4.

Special Provision #5.

Hydrologic monitoring at the site shall be conducted in accordance with the Hydrologic Monitoring System Plan (HMSP) contained in Appendix 9A of the Request for Permit Amendment and Approval to Construct the 2019 North Lateral Expansion, and Application for Permit Renewal (docs #96921-

#96925); dated January 31, 2020; as submitted by Barker Lemar Engineering Consultants; and the following:

a. The HMSP shall include:

Monitoring wells - MW-10R (background), MW-26, MW-28, and MW-29, and Groundwater underdrains - Phase 2 Underdrain, GU-1, GU-2, GU-3A, and GU-4A.

b. DNR construction documentation form 542-1277 and boring logs for all monitoring wells and piezometers shall be submitted within 30 days of installation. DNR construction documentation form 542-1323 shall be submitted within 30 days of establishing surface water monitoring points.

c. The permit holder shall conduct background and routine semiannual groundwater sampling and analysis; as well as perform statistical tests for the approved monitoring points for Appendix I in accordance with rule 113.10(455B). Groundwater samples shall not be field-filtered prior to laboratory analysis and total suspended solids shall be analyzed using Method 1376585, with a reporting limit goal of <= 2 mg/l). Turbidity measurement may be approved by the DNR in lieu of TSS, provided a correlation between the two is established.

Discharges from the R2-1 and R2-2 Cells' groundwater underdrains monitored at GU-1 and GU-2 were reported as being directed into the leachate collection system by the permit holder in the February 29, 2012 letter (doc #68997) from Barker Lemar Engineering Consultants. Consequently, the sampling frequency at groundwater underdrain monitoring points GU-1 and GU-2 shall be annually, provided discharge from these points continues to be managed as leachate.

d. The permit holder shall include in each AWQR an evaluation of TSS/turbidity data and other pertinent sampling and analytical results, to determine if representative samples of groundwater have been collected. If samples are not representative, the permit holder may be required to utilize low flow or no-purge sampling methods, consider new well construction with an optimized filter pack design, and/or additional well development. If sample quality does not improve with improved well construction, well development, and/or sampling methods, the DNR will consider higher TSS/turbidity levels as representative of site groundwater conditions.

e. The frequency for full Appendix II analysis at monitoring points that are in assessment monitoring and have had at least two (2) rounds of analysis using the entire Appendix II list may be decreased to once every (5) five years. If monitoring points exit assessment monitoring and later return to assessment monitoring an additional two (2) rounds of analysis using the entire Appendix II list is required.

f. The permit holder shall semiannually measure groundwater elevations within 1/100 of a foot in each well and immediately prior to purging, each time groundwater is sampled.

g. The permit holder shall collect semiannual groundwater elevation measurements from the groundwater piezometer installed in the R2-1 cell, as referenced in the construction certification report for that cell (doc #9124), dated September 20, 2007 in order to measure the separation of the base of the MSWLF unit from the groundwater table as required in

paragraph 113.6(2)"i". These data shall be included in the facilities' Annual Water Quality Report (AWQR).

h. *An AWQR summarizing the effects the facility is having on groundwater quality shall be submitted to the DNR's Solid Waste Section by January 31 each year. This report shall be prepared in accordance with subrule 113.10(10) by a qualified groundwater scientist pursuant to paragraph 113.10(1)"d" and by using the DNR Annual Water Quality Report Format.*

i. *Groundwater monitoring points MW-13 and MW-19 located in Phase 2 have been previously abandoned.*

j. *The monitoring well construction documentation forms for MW-26, MW-27, and MW-28, as acknowledged on July 30, 1993 (doc #67287); are incorporated into the permit.*

k. *The well abandonment documentation form for monitoring well MW-12, as attached to the July 9, 2002 correspondence (doc #51770) from Barker Lemar Engineering Consultants; is incorporated into the permit.*

l. *The well abandonment documentation form for monitoring well MW-10 and the construction documentation and boring log for MW-10R (doc #51695), dated August 10, 2005 by Barker Lemar Engineering Consultants, is incorporated into the permit.*

m. *The well abandonment documentation forms for monitoring wells MW-8, MW-17, and MW-18 (doc #13865), dated November 21, 2007 by Barker Lemar Engineering Consultants, are incorporated into the permit.*

n. *The MW-30 well construction documentation (doc #44289), dated June 24, 2009, as submitted by Barker Lemar Engineering Consultants, is incorporated into the permit.*

o. *The monitoring well documentation for MW-29 (doc #59411), dated July 21, 2010 and submitted by Barker Lemar Engineering Consultants, is incorporated into the permit.*

p. *The monitoring well installation documentation for monitoring wells MW-31, MW-32 and MW-33 (doc #76138); dated February 26, 2013; as submitted by Barker Lemar Engineering Consultants; and approved October 9, 2013; is incorporated into the permit.*

q. *The groundwater monitoring well construction documentation for MW-34A, MW-34B, MW-35A, MW-35B, MW-36, MW-37, MW-38A, and MW-38B, as contained in Appendix 4 (Hydrogeological Report) within the Request for Permit Amendment and Approval for Construct the 2019 North Lateral Expansion and Application for Permit Renewal (docs #96921-#96925), dated January 31, 2020; as submitted by Barker Lemar Engineering Consultants; is incorporated into the permit.*

There are no changes required or requested to Special Provision #5.

Special Provision #6.

The permit holder shall conduct subsurface gas monitoring in accordance with the Methane Monitoring Plan contained in Appendix 9B of the Request for Permit Amendment and Approval to

Construct the 2019 North Lateral Expansion, and Application for Permit Renewal (docs #96921-#96925); dated January 31, 2020, and the following:

a. *The permit holder shall quarterly monitor and annually report site methane concentrations in accordance with rule 113.9(455B). Specific actions, as defined in the rules, shall be taken in the event of methane gas level limit exceedances.*

b. *The permit holder shall annually submit a report by January 31 summarizing the methane gas monitoring results and any action taken resulting from gas levels exceeding the specified limits during the previous 12 months as a supplement to the facility Annual Water Quality Report, as defined in subrule 113.10(10).*

c. *The boring log/well construction information submitted in document entitled "Gas Monitoring Probe Installation" (doc #84299), dated September 24, 2015 and approved on December 1, 2015, is incorporated into the permit. Gas probes LFGW-1A, LFGW-1B, and LFGW-1C are added to the gas monitoring plan.*

There are no changes required or requested to Special Provision #6 with this submittal. Updates to the gas monitoring plan in light of the Phase 1 MSWLF unit ending post closure and planned installation of perimeter gas monitoring probes to replace groundwater underdrain system monitoring are being considered and will be submitted under separate cover.

Special Provision #7.

In accordance with the variance to allow disposal of untreated petroleum contaminated soils (doc #95968, PCS) approved on September 24, 2019, the permit holder is authorized to directly dispose of untreated PCS at the working face for a period to coincide with the solid waste permit expiration date; and the following:

a. *The PCS must be immediately buried at the working face pursuant to 567.113.8(1)"b"(3).*

b. *The untreated PCS must not contain free liquids pursuant to 567.113.8(1)"b"(1).*

c. *PCS resulting from the cleanup of petroleum underground storage tanks are exempt from RCRA hazardous waste management if the soil 1) exhibits the TC for D018-D043, and 2) are subject to the corrective action requirements in 40 CFR Part 280 of the UST regulations. This exemption does not apply to petroleum contaminated media resulting from spills or releases from above ground storage tanks, other surface spills, or if the PCS becomes contaminated with a listed hazardous waste.*

d. *PCS meeting the above-referenced criteria is deemed a "solid waste" and therefore applicable waste flow and tonnage fee requirements will need to be adhered. PCS may continue to be received for remediation pursuant to subrule 109.11(2), or accepted from outside the planning area for disposal as long as the provisions of IAC 567 Chapter 101.4 are followed (i.e. maintain written approvals).*

There are no changes required or requested to Special Provision #7.

Special Provision #8.

The permit holder is authorized to collect, process, grind, or chip trees, limbs, brush, and clean wood wastes free of coatings and preservatives, for the purposes of reuse as bedding material, mulch, compost bulking material; or for other beneficial reuses, in accordance with the following:

a. *Trees, limbs, brush, and clean wood wastes shall not be stored for a period exceeding twelve (12) months before processing.*

b. *Ground or chipped materials shall not be allowed to accumulate such that the stockpiles are not completely reused within twelve (12) months of initial stockpiling.*

c. *The processed materials may be used as mulch or soil conditioner for off-site purposes and on landfill areas with intermediate and final cover and on soil borrow areas.*

d. *Mulch or soil conditioner applied to existing vegetated landfill areas shall be applied at a rate such that established vegetation is not adversely impacted by its use.*

There are no changes required or requested to Special Provision #8.

Special Provision #9.

The permit holder is authorized to use a geotextile by the trade name Airspace Saver™, manufactured by FABRENE®, as an alternative cover material for the active MSWLF unit, subject to the following:

a. *The use and installation of this product shall be in conformance with the manufacturer's recommendations.*

b. *This product shall only be used as a daily alternative cover material and shall not be utilized as a replacement for soil cover if application performance in terms of litter, vector, odor, and precipitation entry control is not provided.*

c. *This product shall be applied so as not to promote water ponding, or drainage run-on from adjacent upper and side MSWLF unit areas beneath the installed geotextile.*

d. *This product shall be weighted at the close of each working day to prevent displacement by wind using soil or tires.*

e. *This product shall not be exposed for longer than seven (7) consecutive days. For any waste covered with this product beyond the stipulated period, the product shall be removed and the underlying waste shall be immediately covered with soil in accordance with the applicable IAC rules.*

f. *This product shall not be used if it becomes damaged or worn, or if the intended performance is breached. In such instances, this product shall be disposed of as a part of the waste fill.*

g. *The operator shall inspect each application of this product for thorough coverage and cover integrity. If operational problems arise from the use of this product or its method of*

application, the use of this product shall be suspended until proper corrections are made by the operator, with six inches of compacted daily cover being utilized during this interim period.

h. *If, at any time, the DNR or permit holder deems this product ineffective or otherwise unsatisfactory, the permit holder shall immediately revert to soil or another previously approved alternative daily cover. The permit holder shall immediately notify the DNR's Main and local Field office through both written and verbal notification of this action. This notification is not necessary if use of this product ceases only on a temporary basis, such as during adverse operational or weather conditions.*

There are no changes required or requested to Special Provision #9.

Special Provision #10.

The permit holder is authorized to accept, store, process, reuse or dispose of roofing shingles within the permitted facility boundaries in accordance with the following conditions:

a. *Shingle loads received at the facility which are determined to be asbestos containing material (ACM) shall be managed in accordance with Iowa Administrative Code (IAC) 567 Chapter 109.*

b. *Fugitive dust prevention methods must be available, operational and employed during stockpiling, processing and material handling operations to provide dust control and worker protection in compliance with IOSHA and NESHAP rules and regulations. Any asbestos sampling and analysis shall comply with IOSHA and NESHAP rules and regulations.*

c. *Reuse of compacted whole shingles at the facility is authorized on the condition that only shingles with an asbestos content of 1% or less shall be used as a roadway subbase. Such use is limited to the Storage Pad Construction Project, dated August 18, 2021 (doc#101071), as prepared by Evora Consulting, using shingles that meet the QC Plan for Recycling as contained in Attachment A of this document. This project consists of the construction of a yard waste, wood waste, and scrap metal storage pad located north/northwest of the maintenance building on the west side of Phase 2, Region 1.*

   Use of shingles in excess of the 8-12 inch thick, loose shingle layer described in the above document may constitute disposal and be subject to the statewide tonnage fee.

There are no changes required or requested to Special Provision #10.

Special Provision #11.

The permit holder is authorized to accept and temporarily store a maximum of 1500 waste tire equivalents for the purpose of reclamation processing or disposal. Tire storage and processing shall be conducted at approved plan locations. The tires shall be removed at least once every 120 days and transported to the appropriate reclaimer/processor, or disposed of at the site. All operations shall be in accordance with subrule 109.10(3), IAC 567 Chapter 117 and the current local fire code.

There are no changes required or requested to Special Provision #11.

Special Provision #12.

The permit holder is authorized to temporarily store white goods and scrap metal in an area designated by the operator. No discarded appliance may be stored for more than 270 days without being demanufactured. No scrap metal or discarded appliance may be stored for more than a total of twelve (12) months, including demanufacturing processing, prior to being recycled/salvaged. The operator and salvaging contractor shall comply with applicable provisions of IAC 567 Chapter 118 and the General Provisions of this permit. No scavenging shall be allowed.

There are no changes required or requested to Special Provision #12.

Special Provision #13.

The permit holder is authorized to accept and temporarily store lead acid batteries for recycling purposes. Lead acid batteries must be stored in a designated area that will curtail movement of acids and provide proper ventilation of gases from the batteries. The maximum length of time for storage is twelve (12) months.

There are no changes required or requested to Special Provision #13.

Special Provision #14.

The permit holder is authorized to collect and temporarily store plastic farm pesticide containers for recycling. The storage area shall be located at a readily accessible area to the facility. The following conditions and procedures shall apply:

a. *Pesticide containers containing any product or free liquids shall not be accepted for recycling or disposal.*

b. *The storage area shall be used only for recyclable plastic farm pesticide containers that have been properly rinsed and drained. Contact the Iowa Department of Agriculture and Land Stewardship (IDALS) Pesticide Bureau at (515) 281-8506 for container rinsing and recycling information.*

c. *The storage area shall be either fenced or provided with a recycle bin to keep the containers segregated from other wastes and to prevent them from leaving the storage area during windy conditions.*

d. *The storage area base shall be graded to divert surface water run-on. An all weather access to the area shall be provided.*

e. *The base of the storage area that does not utilize a recycle bin should be provided with either an impervious surfacing, or rock or anchored plastic membrane surfacing over a compacted soil base to keep the containers free of dirt to maximize material recovery and minimize damage to recycle grinding equipment.*

f. *All stored containers shall be removed from the temporary storage area and granulated on-site for recycling purposes by April 1st annually. Contact the Agribusiness Association of Iowa at (515) 262-8323 to schedule container recycle granulation and site removal.*

g. *The storage area shall be monitored frequently by the operator to confirm proper usage and to visually check for the presence of any product or rinsate releases to the environment or storage area.*

h. *Any containers found in the storage area with free product or product rinsate liquids shall be promptly removed from the storage area and either returned to the disposer or properly rinsed, drained and the liquids discharged to the on-site leachate storage system or land applied on the landfill site at the allowable labeled application rate for the product. Care should be taken to apply the product liquids to the appropriate area.*

i. *If any apparent releases to the storage area are observed by the operator or DNR personnel, the operator shall promptly report the event to the IDALS Pesticide Bureau by telephone at (515) 281-8506 with a follow-up written report of the event to IDALS. Report copies shall be provided to the DNR's Main and local Field office. IDALS representatives will conduct a site visit, sample the appropriate areas, complete the necessary contaminant(s) testing and notify the DNR of any recommended actions to be taken. The DNR will inform the permit holder of required actions to remedy the release.*

There are no changes required or requested to Special Provision #14.

Special Provision #15.

The permit holder is authorized to collect and temporarily store rigid recyclable wastes (e.g., metal cans, glass bottles and plastic bottles) and fiber recyclable wastes (e.g., magazines, catalogs, books, envelopes and paper) in segregated recycling boxes located near the landfill entrance. The following conditions and procedures shall apply:

a. *The recyclables shall not be stored for a period exceeding six (6) months.*

b. *The recycle boxes shall be fitted with lids to prevent precipitation entry and to control litter.*

c. *Separate boxes should be provided to segregate metals and plastics to facilitate recycling recovery.*

d. *Recycling boxes shall be labeled to facilitate public use.*

e. *Records shall be maintained to document amounts of waste recycled for quarterly Solid Waste Fee reporting and the dates that each box content is removed from the site for recycling to confirm storage time limitations.*

f. *Recycling activities shall be monitored to ensure that no other disposable wastes are stored in recycle boxes.*

g. *Farm chemical containers shall not be stored in recycling boxes. Separate authorization for this purpose shall be secured by permit amendment.*

There are no changes required or requested to Special Provision #15.

Special Provision #16.

The permit holder shall close the Phase 2 MSWLF Unit in accordance with the Closure Plan contained in Appendix 7 of the Request for Permit Amendment and Approval to Construct the 2019 North Lateral Expansion, and Application for Permit Renewal (docs #96921-#96925); dated January 31, 2020; as submitted by Barker Lemar Engineering Consultants; and the following:

a. *The Construction Certification Report, Phase 0 Cell Construction and Closure Construction (doc #9124), dated September 20, 2007, submitted by Barker Lemar Engineering Consultants, and approved on September 24, 2007, is incorporated into the permit. The report documents the construction of final cover over 7.5 acres of Phase 2, Region 1.*

There are no changes required or requested to Special Provision #16. It should be noted that minor updates to the final cover storm water management design will be required prior to closure due to the final cover revisions. Updates are not being submitted at this time as any closure of the areas of final grade modified is well beyond the permit renewal period, may be subject to further modification prior to being actually constructed, and the current design demonstrates that storm water management on the final cover is feasible.

XI. Special Provisions – Closed Units

The DNR received a fully executed copy of the previously agreed upon environmental covenant (EC) for the closed Phase I MSWLF Unit on October 20, 2025. The EC was recorded at the Lee County Recorder's Office as Document 2025 4407 on October 17, 2025 See also Document No. 114521.

There are no changes required or requested to XI. Special Provisions – Closed Units.

Pursuant to the requirements outlined in Form 50, updates have been made to the Organizational Chart and Operator Certification, found in **Appendix D**, and the Proof of Financial Assurance is included in **Appendix E.**

2.4 NEW PERMIT AMENDMENT REQUESTS

GRRWA is requesting a new permit amendment to include the design modifications provided in **Appendix C**. These modifications include raising the base of the unconstructed portion of Phase 2, Region 3 to tie into the elevated base grades of Cell R3-2; incorporating the previously constructed perimeter berm on the west side of Cell R3-4; and removing the three groundwater underdrain cleanouts and two leachate cleanouts located on the north side of Phase 2, Region 1 as previously requested in Document #109783 and approved in Document # 109789. The removal of these cleanouts provided the opportunity to reroute the remaining leachate cleanout and to remove the subsurface berm separating Cells R3-7 and R3-4. Eliminating the berm will increase the available airspace in Phase 2, Region 3, and improve overall stormwater drainage within that area. These modifications also include redesigning the groundwater underdrain beneath Cell R3-7 from a blanket-style underdrain system to a trench-style system, consistent with the design used in Cells R3-2 through R3-6.

2.5 EQUIVALENCY REVIEW REQUESTS

GRRWA does not have any current equivalency review requests.

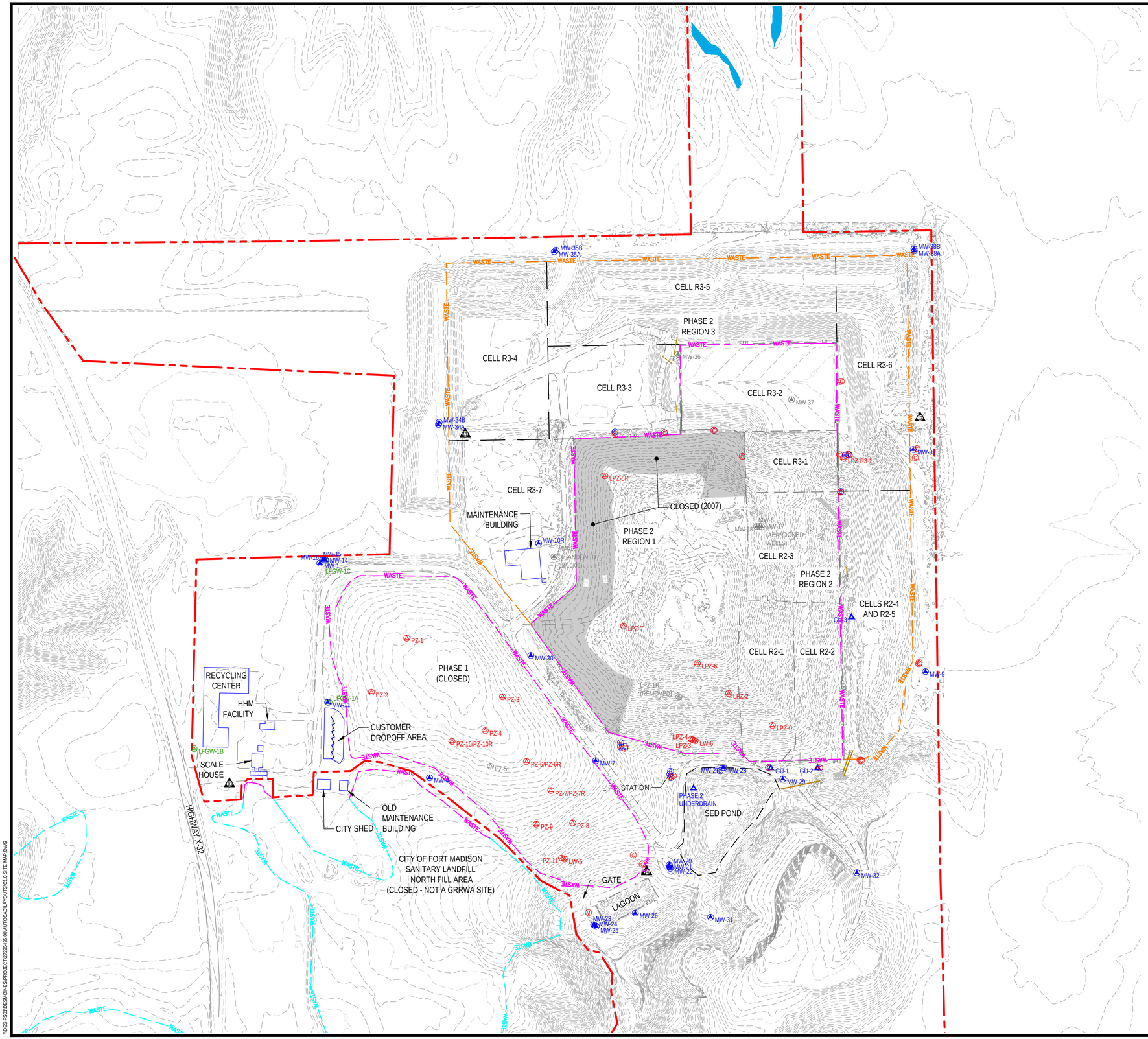
2.6 NEW VARIANCE REQUESTS

GRRWA does not have any new variance requests from Iowa Administrative Code requirements.

2.7 REQUIRED PLANS AND SPECIFICATIONS

Appendices are included to address the updates as noted in Section 2 of Form 50 (included in Section 1 of this document). Updated plans, documentation, and information are found as follows:

- Appendix A Comprehensive Plan – Emergency Management Services Approval
- Appendix B Emergency Response and Remedial Action Plan (ERRAP)
- Appendix C Modifications to Design Plans and Specifications
- Appendix D Organizational Chart and Operator Certification
- Appendix E Proof of Financial Assurance



LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPERTY BOUNDARY
- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
- EXISTING CELL BOUNDARY
- FUTURE CELL BOUNDARY
- FML BOUNDARY
- PAVED ROAD
- UNPAVED ROAD
- BUILDING
- LEACHATE CLEANOUT
- LEACHATE VALVE
- LEACHATE MANHOLE
- LEACHATE LIFT STATION
- LEW-1 LEACHATE EXTRACTION WELL
- LPZ-1 LEACHATE PIEZOMETER
- GROUNDWATER UNDERDRAIN CLEANOUT
- GROUNDWATER UNDERDRAIN VALVE
- GROUNDWATER UNDERDRAIN MANHOLE
- GROUNDWATER UNDERDRAIN LIFT STATION
- GU-1 GROUNDWATER UNDERDRAIN DISCHARGE POINT
- MW-1 MONITORING WELL
- MW-1 ABANDONED MONITORING WELL
- CULVERT
- SURVEY CONTROL POINT

NOTES:

1. EXISTING SURFACE CONTOURS ON THIS SHEET ARE A COMPOSITE OF TOPOGRAPHICAL SURVEY INFORMATION FROM STEGER CONSTRUCTION DATED AUGUST 5 2024, TOPOGRAPHIC SURVEY INFORMATION FROM BENZING SURVEYING DATED AUGUST 15 2023, AND HISTORICAL SURVEY INFORMATION FROM BARKER LEMAR ENGINEERING CONSULTANTS.

SURVEY CONTROL POINTS			
NUMBER	NORTHING	EASTING	ELEVATION
CP10	245789.41	2246188.31	715.95
CP11	247214.36	2247147.97	716.17
CP12	247280.52	2249001.37	714.40
CP13	244620.85	2249100.71	708.81
CP14	245430.98	2247886.89	646.91
CP15	243782.97	2247345.72	702.00

200 0 200 400
SCALE FEET

REV.	DATE	CK. BY
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	.	.
	.	.
	.	.
	.	.
	.	.

SHEET TITLE
SITE MAP

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

PROJ. NO.: 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

CADD FILE:
C1.0 SITE MAP.DWG

DATE:
11/17/25

FIGURE NO.
1.1

\DES-FS01\DES\DMOINES\PROJECT\27225435.00\AUTOCAD\LAYOUTS\C1.0 SITE MAP.DWG

Appendix A

Comprehensive Plan – Environmental Management System Annual Report Approval

IOWA

Rasmus, Laurie <laurie.rasmus@dnr.iowa.gov>

EMS Annual Report Approval

1 message

Rasmus, Laurie <laurie.rasmus@dnr.iowa.gov> Mon, Oct 14, 2024 at 10:52 AM
To: Trenton Burgess <tburgess@grrwa.com>

IOWA | DNR
IOWA DEPARTMENT OF NATURAL RESOURCES

GOVERNOR KIM REYNOLDS
LT. GOVERNOR ADAM GREGG
DIRECTOR KAYLA LYON

The Department of Natural Resources received the 2024 Environmental Management System (EMS) Annual Report submitted by your organization on or before the annual September 1st due date. The report has been reviewed and the following items have been noted:

- The elements set forth in IAC 567-111 were addressed;
- Progress toward objectives and targets was achieved;
- Continuous improvement was accomplished.

The EMS Annual Reports reflect the effort program participants put into the voluntary Environmental Management System program, which was developed to promote locally determined goals.

Should you have any questions or concerns, please do not hesitate to contact me at Laurie.Rasmus@dnr.iowa.gov or 515-474-4921.

Sincerely,

Laurie Rasmus

Laurie Rasmus
Land Quality Bureau, Financial and Business Assistance

Appendix B

Emergency Response and Remedial Action Plan (ERRAP)

Emergency Response and Remedial Action Plan (ERRAP)

Prepared For:

Great River Regional Waste Authority Sanitary Landfill
2092 303rd Avenue
Fort Madison, IA 52627

Permit No. 56-SDP-07-80

SCS ENGINEERS

Project No. 27225270.00 | November 2025

1690 All State Court, Suite 100
West Des Moines, IA 50265
(515) 631-6160

Table of Contents

Attachments

1.0 EMERGENCY RESPONSE AND REMEDIAL ACTION PLANS [567 IAC – 113.8(5)(455B)]

113.8(5)b(1) Facility Information

The Great River Regional Waste Authority (GRRWA) owns and operates the Great River Regional Waste Authority Sanitary Landfill (Landfill).

The Great River Regional Waste Authority Sanitary Landfill receives municipal solid waste (MSW), construction and demolition debris (C&D), and industrial waste from the GRRWA's service area.

113.8(5)"b"(1)1 Permitted Agency

Great River Regional Waste Authority

113.8(5)"b"(1)2 DNR Permit Number

56-SDP-07-80P

113.8(5)"b"(1)3 Responsible Official and Contact Information

The Responsible Official for this facility has been designated as the General Manager, a position currently held by Austin Banks, or in his absence, the Lead Operator, a position currently held by Dan Hermes. If the General Manager is unable to be contacted, the Lead Operator will be the secondary contact. Contact information is included below.

Mr. Austin Banks, General Manager
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, Iowa 52627
(319) 372-6140

Mr. Derek Hamm, Lead Operator
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, Iowa 52627
(319) 470-6221

113.8(5)"b"(1)4 Certified Operator and Contact Information

The certified operators for this facility are positions currently held by Austin Banks (General Manager) and Daniel Hermes (Lead Operator), as well as others. Contact information is included below.

Mr. Austin Banks, General Manager
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, Iowa 52627
(319) 372-6140

Mr. Derek Hamm, Lead Operator
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, Iowa 52627
(319) 470-6221

113.8(5)"b"(1)5 Facility Description

Municipal solid waste landfill, recycling center, and household hazardous materials regional collection center.

113.8(5)"b"(1)6 Site and Environs Map

See **Attachment 1** for Site Plan Maps.

113.8(5)b(2) Regulatory Requirements

113.8(5)"b"(2)1 Iowa Code Section 455B.306(6)"d" Criteria Citation

This Emergency Response and Remedial Action Plan (ERRAP) is designed to meet the requirements of Iowa Administrative Code (IAC) 567 Chapter 113.8(5) that requires the submission of an ERRAP by all sanitary disposal projects.

This ERRAP is intended to:

- Identify possible occurrences that may endanger human health and the environment;
- Establish provisions to minimize the possibility of fire or explosion; and
- Establish provisions to minimize any releases to air, land, or water of pollutants that could threaten human health and the environment.

113.8(5)"b"(2)2 Reference to Provisions of the Permit

An updated ERRAP will be submitted at the time of each permit renewal application if a review indicates that revisions are required. The ERRAP is intended to be flexible and to meet contingencies arising at the facility. Requests for changes to the ERRAP may be submitted to the General Manager.

113.8(5)b(3) Emergency Conditions, Response Activities and Remedial Action

113.8(5)"b"(3)1 Failure of Utilities

Utilities include natural gas in the recycling center, propane in the office, electricity, and water.

Natural Gas and Propane Gas Supply

Natural Gas or Propane Gas Supply Failure – Short-Term and Long-Term

If the facilities are without propane gas supply and propane gas odor is not present, contact:

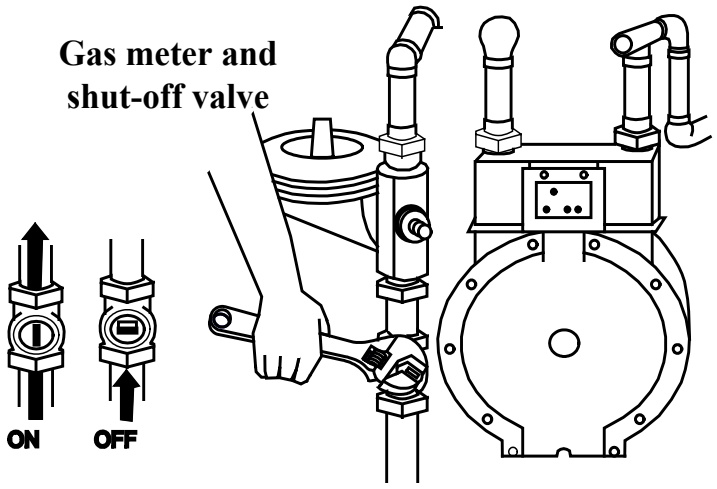
- General Manager – See **Attachment 2** for telephone and mobile phone numbers.
- Natural Gas or Propane Company – See **Attachment 2** for telephone numbers.

Natural Gas Leak

If a gas odor is present and it is strong, take immediate action:

- Try to shut off the natural gas by turning the shut-off valve to the horizontal position.
- Leave the building where the odor is identified. Go to the Emergency Assembly Location. In the event the Emergency Assembly Location is dangerous or inaccessible, proceed to the Secondary Emergency Assembly Location (See Attachment 1).
- Account for personnel, guests, contractors, etc.
- Do not attempt to locate gas leaks.
- Open doors and windows.
- Do not turn lights on or off or unplug electrical appliances.
- Do not use telephones in or around the building or office.
- Do not position or operate vehicles or powered equipment.
- Do not attempt any other repairs to the natural gas systems.
- If you turn off the gas for any reason, it must be turned back on by a professional.

After the natural gas has been shut-off and the facility ventilated, or the facility has been evacuated to a safe distance, then the following individuals must be contacted:



Have wrench stored in a specific location where it will be immediately available

Propane Gas

Propane Gas Supply Failure – Short-Term and Long-Term

In the event Landfill facilities are without propane gas supply and propane gas odor is not present, contact the following:

- General Manager – See Attachment 2 for telephone and mobile numbers.
- Propane Gas Company – See Attachment 2 for telephone numbers.

Propane Gas Leak

If a gas odor is present and it is strong, take immediate action:

- Propane gas is an asphyxiate. In proper concentrations, it can suffocate a person – use caution if a gas odor is present.
- Try to shut off the propane gas by turning the shut-off valve to the horizontal position.
- Leave the building where odor is identified. Go to the Emergency Assembly Point. Account for Landfill personnel, guests, contractors, etc.
- Do not attempt to locate gas leaks.
- Open doors and windows.
- Do not turn on or off or unplug electrical appliances.
- Do not use telephones in or around the building or office.
- Do not position or operate vehicles or powered equipment.
- Do not attempt any other repairs to the propane gas systems.
- If you turn off the gas for any reason, it must be turned back on by a professional.

Electricity

Electricity Failure – Short-Term and Long-Term

In case of electrical failure, the following individuals must be contacted:

- General Manager – See **Attachment 2** for telephone and mobile numbers.
- Electricity Supply Company – See **Attachment 2** for telephone number.

Scale Failure Due to Electricity Supply Failure

Scale weights may be estimated based on vehicle size (volume of waste) and converted to tons, or historical scale weights may be used for representative loads from particular vehicles or companies. Note each load for which the weight was estimated.

Buildings

Although the facility is primarily open during daylight hours, twilight and dusk operations may require supplemental light and heat if the electricity fails. Non-electrical space heaters may be used for supplemental heat; however, manufacturer's recommendations for ventilation must be observed.

- Keep portable and space heaters at least 3 feet from combustible materials.
- Electric flashlights and electric lanterns should be used for supplemental light.
- Use extreme caution if candles must be used, candles should only be used temporarily, on a limited basis until a safer form of light can be located such as flashlights, electric lanterns, etc. Candles within glass containers are preferred over those with open/exposed flame.
- Never leave a burning candle unattended. Extinguish all candles when leaving a room.
- Never use a candle for light when fueling equipment.

Water

Water Failure – Short-Term and Long-Term

In case of water failure, the following individuals must be contacted:

- General Manager – See **Attachment 2** for telephone and mobile numbers.
- Water Supply Company – See **Attachment 2** for telephone number.

113.8(5)"b"(3)2 Evacuation Procedures During Emergency Conditions

- See the Site Plan Map (**Attachment 1**) for evacuation meeting locations and evacuation routes.

113.8(5)"b"(3)3 Weather-Related Events

Use battery operated radios/televisions to receive the most updated information on local conditions.

Tornado and Wind Events

Tornado Terminology

- Tornado Watch – The weather conditions are possible for a tornado.
- Tornado Warning – A tornado has been sighted or indicated by weather radar.

Tornado Watch Procedures

- Listen to the radio or television for more information.
- Locate emergency supplies such as battery-powered radio, mobile telephone, and spare batteries.
- Be prepared to take shelter in the designated tornado shelter (see **Attachment 1**).
- If you see any revolving funnel-shaped clouds, report them immediately by telephone to your local law enforcement agency.
- If you are in a trailer or similar structure, move to a more secure structure.

Tornado Warning Procedures

- Take shelter with a battery-operated radio. Take shelter in area(s) designated as a tornado shelter or an interior room or hallway.
- The facility's Tornado Shelter Location is shown on the Site Plan Map (See **Attachment 1**).
- If you cannot reach the Tornado Shelter, go to a crawlspace under the scales or to an inside hallway on the lowest level. Avoid places with wide-span roofs. Stay away from windows and open spaces. Get under a piece of sturdy furniture such as a workbench, heavy table, or desk and hold on to it.
- Turn on a battery-operated radio or television and wait for the "all clear" announcement by the authorities.

Tornado Safety – Outdoors

- During tornado warning, Landfill staff and supervisors proceeding to a shelter by vehicle should keep an eye out for any other employees or customers along the way and pick them up for transport.
- If possible, get inside a substantial building.
- If shelter is not available or there is no time to get indoors, lie in a ditch, culvert, or low-lying area or crouch near a strong building. Use your arms to protect your head and neck. Be alert for potential flash flooding.

Tornado Safety – In a Vehicle

- Never try to outrun a tornado in a vehicle. Heavy rain, hail, and traffic may impede your movement. Tornadoes can change directions quickly and can easily lift up a vehicle and toss it through the air.
- Pull to the side of the road avoiding trees, power lines, and other objects that could fall or be hazardous.
- Get out of the vehicle immediately and try to take shelter in a nearby building.
- If there is not time to get indoors, get out of the vehicle and lie in a ditch, culvert, or low-lying area away from the vehicle. Use your arms to protect your head and neck.

After a Tornado

- Try to get out of damaged buildings. Once out, do not re-enter the damaged building unless necessary and use great caution.
- Extinguish all smoking and small fires.
- Monitor the radio or television for emergency information or instructions.
- Account for Landfill personnel, known guests/customers/contractors, and check on neighbors who may require special assistance.
- Check for injured victims. Render first aid if necessary. Call the necessary emergency responders such as ambulance services or fire/rescue services.
- Do not attempt to move severely injured victims unless necessary. Wait for emergency medical assistance to arrive.
- Watch out for broken glass and downed power lines.
- Report any downed power lines.
- Use the telephone only for emergency calls. Telephone lines may be down. Mobile telephone services may be used for emergency calls.
- Take photos or videotape of the damage to the property.
- If driving, be alert for hazards in the roadway.
- If unaffected by the tornado, stay out of the damaged area until allowed in by officials. Your presence may hamper emergency operations.

After a Tornado – Gas Leaks

- Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and quickly leave the area.
- Call the Natural Gas and/or Propane Gas Company from a mobile telephone or a telephone away from the affected property.

After a Tornado – Electrical System Damage

- Look for electrical system damage.
- If you see sparks, broken or frayed wires, or if you smell hot insulation, turn off the electricity at the main fuse box or circuit breaker.
- If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice.
- See **Attachment 2** for emergency contacts.

After a Tornado – Sewage and Water Line Damage

- Check for sewage and water line damage.
- If you suspect sewage lines are damaged, avoid using the toilets and call a plumber.
- If water pipes are damaged, contact Water Company and avoid using water from tap.

After a Tornado – Methane Collection and Venting Systems

- Check methane collection/venting systems.
- If the collection/venting system lines are malfunctioning, contact a professional engineer for repair assistance.
- Monitor methane gas soon after the incident to check for hazardous methane levels. Remember that methane (by itself) is an odorless gas.

After a Tornado – Leachate Transportation and Leachate Storage Systems

- Check leachate transportation and storage systems including tanks, lagoons, and lines.
- If leachate is leaking into the environment, attempt to shut the leachate line valve, stopping the flow.
- If leachate is leaking into the environment from a lagoon, take immediate steps to limit flow into drainage ways by constructing an earthen berm.
- Report leachate spills to the Iowa Department of Natural Resources (See **Attachment 2** for emergency contacts).

After a Tornado – Bulk Fuel Systems

- Extinguish all smoking and small flames.
- If a spill/leak exists, attempt to stop the leak/spill or absorb fuel with inert materials.
- If bulk fuel is leaking into the environment from a storage system, take immediate steps to limit flow into drainage ways by constructing an earthen berm.
- Report spills or leaks to the Iowa Department of Natural Resources (See **Attachment 2** for emergency contacts).

Wind Storm Terminology

- Derecho – A line of intense, widespread, and fast-moving windstorms and sometimes thunderstorms that moves across a great distance and is characterized by damaging winds.

- Down Burst – A strong out rush of wind formed by rain cooled air. Strong down bursts, which produce extensive damage, are often mistaken for tornadoes. A downburst can easily overturn a mobile home, tear roofs off houses, and topple trees.

Winter Storm Terminology

- Winter Storm Watch – Indicates that severe winter weather may affect your area.
- Winter Storm Warning – Indicates that severe winter weather conditions are definitely on the way.
- Blizzard Warning – Indicates that large amounts of falling or blowing snow and sustained winds of at least 35 miles per hour are expected for several hours.

Winter Storm Procedures

- Listen to the radio or television for more information.
- Locate emergency supplies such as battery-powered radio, mobile telephone, and spare batteries.
- Be prepared to take shelter in the designated tornado shelter (see **Attachment 1**).
- If you are in a trailer or similar structure, move to a more secure structure.
- Proceed with caution as snow can hinder vision and ice can cause vehicles and people to slide.

Intense Rainstorms, Mud, and Erosion

Thunderstorm Terminology

- Severe Thunderstorm Watch – A severe thunderstorm (damaging winds 58 miles per hour or more, or hail three-fourths of an inch in diameter or greater) is likely to develop.
- Severe Thunderstorm Warning – A severe thunderstorm has been sighted or indicated by weather radar.

Thunderstorm Watch Procedures

- Locate a safe place, such as the designated tornado shelter.
- Assign someone to listen to a battery-powered radio or television for more information.

Thunderstorm Warning Procedures

- Go to a safe place, such as the designated tornado shelter.
- Turn on a battery-operated radio or television and wait for the “all clear” by the authorities.
- Tornadoes are spawned by thunderstorms and flash flooding can occur with thunderstorms. When a “severe thunderstorm warning” is issued, review what actions to take under a “tornado warning” or a “flash flood warning.”

Procedures After a Thunderstorm

- Check personnel, guests, clients, and contractors for injuries.
- Report downed utility wires.
- Check scale for proper operation. If the electricity is out, see Section113.8(5)“b”(3)1.

- Continue to listen to the radio for flash flood and/or tornado watches and warnings and other instructions and advice.

Check Leachate Transportation and Leachate Storage Systems

- Check leachate transportation and storage systems including tank and lines.
- If leachate is leaking into the environment, attempt to shut the leachate line valve, stopping the flow of leachate.
- Report leachate spills to the Iowa Department of Natural Resources (DNR). See **Attachment 2** for Emergency Contacts.

Check Bulk Fuel Storage Systems

- Extinguish all smoking and small flames.
- If a spill/leak exists, attend to stop the spill/leak or absorb fuel with inert materials.
- See **Attachment 2** for DNR Emergency Contacts.
- See **Attachment 3** for DNR guidelines for reporting hazardous conditions and a copy of Iowa Administrative Code Chapter 131 (Section 457).

Lightning Strikes

There are relatively safe places from lightning strikes, however no location is free of risk. Large, enclosed structures are generally safer than small or open structures. The risk for lightning injury depends on whether the structure incorporates appropriate lightning protection.

Enclosed vehicles, fully enclosed farm vehicles, etc. with the windows rolled up generally provide good shelter from lightning. Avoid contact with metal or conducting surfaces outside or inside the vehicle.

Avoid being in or near:

- High places and open fields, isolated trees, unprotected sheds, communication towers, flagpoles, light poles, metal fences, and water.
- When inside, avoid the use of the telephone, contact with water or conductive surfaces with exposure to the outside such as metal door or window frames, electrical wiring, telephone wiring, cable TV wiring, and plumbing, etc.

Lightning Strike Victim

- A person who has been struck by lightning does not carry an electrical charge that can shock other people.
- A nearby strike may also cause medical problems, check personnel and call emergency medical assistance (911) if necessary.
- Provide first aid and call emergency medical assistance (911) immediately. Look for burns where lightning entered and exited the body.

Flooding

Flood Terminology

- Flash Flood Watch – A flood is possible, be alert to signs of flash flooding, and be ready to evacuate. Know the local terrain; flash floods can happen more quickly in hilly terrain or low-lying areas.
- Flash Flood warning – A flood is already occurring and will occur soon in your area. Listen to local radio and television for local information and advice.

Flood Damage Prevention Procedures

- Move key documents, electronic files, computers, etc. to higher ground or take them with you if you must evacuate.
- Review evacuation procedures with employees.
- If necessary, attempt to build earthen dams to protect buildings and property.
- Turn on battery-operated radio or television to get the latest emergency information.
- If told to leave, do so immediately.

Procedures During a Flood

- Evacuation may be necessary. If advised to evacuate, do so immediately.
- Never drive into a flooded area.
- Never drive around road barricades.
- In case employees are separated from one another during floods or flash floods, each employee shall contact the General Manager so all employees can be accounted for.
- Evacuation is much simpler and safer before floodwaters become too deep for ordinary vehicles to drive through.
- Listen to a battery-operated radio or television for evacuation instructions.
- Follow recommended evacuation routes – shortcuts may be blocked.
- Leave early enough to avoid being marooned by flooded roads.

Procedures During a Flood – If Outdoors

- Climb to high ground and stay there.
- Avoid walking through any floodwaters. If it is moving swiftly, even water 6 inches deep can sweep you off your feet.

Procedures During a Flood – If in a Car

- Never drive into a flooded area.
- Never drive around road barricades.
- If you come to a flooded area, turn around and go another way.
- If your car stalls, abandon it immediately and climb to higher ground. Many deaths have resulted from attempts to move stalled vehicles.

Procedures After a Flood

- Return to the area only after it has been declared safe by local emergency management officials. Follow all emergency rules, laws, and regulations.
- Report and stay clear from loose power lines or damaged utilities.
- Report downed power lines to your utility company or local emergency manager.
- Some appliances, such as television sets, can shock you even after they have been unplugged. Do not use appliances or motors that have gotten wet unless they have been taken apart, cleaned, and dried.
- Be alert for gas leaks. Use a flashlight to inspect for damages. Do not smoke or use candles, lanterns, or open flames unless you are sure that the gas has been turned off and the area has been aired out.
- Look for fire hazards - broken or leaking gas lines, flooded electrical circuits, submerged furnaces, or electrical appliances, or flammable or explosive materials coming from upstream.
- Service damaged septic tanks, cesspools, pits, and leachate systems as soon as possible. Damaged sewage systems are health hazards.
- Document the damage for insurance purposes by taking notes and photographs.

Structural Stabilization: Temporary Measures

- Identify potential deficiencies and provide temporary shoring to protect life and property while the water levels are receding. All shoring measures should be planned with the assistance of qualified structural engineers or contractors.
- Support unstable or leaning structures or features with temporary bracing and reinforcement.
- Strengthen exposed foundations or brace areas of undermining by following engineer's recommendations.
- Brace and strengthen decayed or damaged floor and ceiling structure. Check bearing locations for movement or settlement.

Check Methane Collection and Venting Systems

- Check methane collection/venting systems..
- Monitor methane gas soon after the incident to check for hazardous methane levels.

Check Leachate Transportation and Storage Systems

- Check leachate transportation and storage systems including tanks, lagoons, and lines.
- If leachate is leaking into the environment, attempt to shut the leachate line valve, stopping the flow.
- If leachate is leaking into the environment from a lagoon, take immediate steps to limit flow into drainage ways by constructing an earthen berm.
- Report leachate spills to the Iowa Department of Natural Resources (See **Attachment 2** for emergency contacts).

Check Bulk Fuel Systems

- Extinguish all smoking and small flames.

- If a spill/leak exists, attend to stop the spill/leak or absorb fuel with inert materials.
- See **Attachment 2** for DNR Emergency Contacts.
- See **Attachment 3** for DNR guidelines for reporting hazardous conditions and a copy of Iowa Administrative Code Chapter 131 (Section 457).

Check for Large Scale Erosion

- Immediately cover any eroded areas exposing waste.
- Identify and repair access roads, approach ramps, and internal roads that were affected by erosion.
- Identify and repair let-down structures, berms, and terraces affected by erosion.

Acceptance of Flood Related Wastes

- Do not accept hazardous material for landfilling, even if it is flood related debris.
- Do not accept free flowing liquids, even if the container is thought to contain only flood-related liquid.
- Do not accept containers that contain unknown materials, especially drums and similar containers that "floated" to the current owner.
- Document all flood-related debris for possible credit/reimbursement from city, county or state government.
- Prepare a request to DNR to exempt exceptional event debris from goal progress and tonnage fee with the next Quarterly Solid Waste Fee Schedule & Retained Fees Report.

Requesting Exemption from Goal Progress and Tonnage Fees

Requests to exempt exceptional event debris from goal progress calculations must be made to DNR on the Quarterly Solid Waste Fee Schedule & Retained Fees Report (DNR form 542-3276). If the governor has declared the city and/or county a disaster area, then the Landfill may also request exemption from solid waste tonnage fees. Requests for exemptions must be made within six months of disposal of the debris and no later than the due date of the corresponding Fee Report for the quarter the waste was disposed.

The exemption requests shall include basic information about the exceptional event. The information required is:

1. Date or dates of duration of the exceptional event.
2. Type of event (i.e. flood, tornado, combination thereof).
3. A description of the affected area(s), including the approximate number of buildings and addresses if available.
4. The type(s) of waste to be exempted.
5. Actual tonnage of debris disposed during the quarter.
6. A preliminary estimate of the total tonnage to be exempted (i.e. tons of waste already disposed and potential tons to be disposed in future quarters).

Check Bulk Fuel Areas Post Weather Related Event

- Check the bulk fuel storage area.

- Specific spill responses are discussed during 24 and 40-hour HAZWOPER (Hazardous Waste Operations and Emergency Response Standard) training. Facility employees are required to have 24-hour training.

Check Household Hazardous Material Processing Area and Hazardous Material Storage Building

- Due to the type of material received, sorted, and stored at the hazardous material storage building, staff must be extremely careful should the facilities or materials themselves be shifted due to any unmanaged event.
- Hazardous materials, incompatible materials, reactive materials, and other chemicals temporarily stored in the hazardous material storage building. After a severe weather event, extreme care must be applied during clean-up and/or inspections activities.
- *NOTE – The hazardous materials storage building is equipped with secondary containment systems located in the floor.*
- The facility should not be opened to the public until hazardous materials that may have been displaced during the weather event are properly managed.
- Specific spill responses are discussed during 24- and 40-hour HAZWOPER training. Facility employees are required to have 24-hour training.

If a Spill is Identified

- Notify the General Manager of the type and amount of material spilled (See **Attachment 2**).
- Assess the type and quantity of the spilled material to determine if outside assistance is required.
- If outside assistance is necessary, contact the appropriate emergency services (See **Attachment 2**).
- If no outside assistance is required, immediately stop the flow by closing the open valve, set container upright, plug the leak, etc.
- Once the spill has been corrected, deploy appropriate waste spill kit tools to prevent material from exiting the hazardous material storage unit, mixing with incompatible materials, or spreading further.
- Use extreme caution while managing a hazardous material spill. A severe weather event may cause more than one material to spill – multiple materials may pose a serious hazard if they are exposed to one another.

Event and Post Event Conditions

See Sections under Section 113.8(5)“b”(3)3 Weather Related Events.

113.8(5)“b”(3)4 Fire and Explosions

In case of any size fire, the following individual must be contacted:

- General Manager – See **Attachment 2** for telephone number.

If a fire cannot be controlled by site personnel, report to the fire department by dialing 911 using cellular phones or the phone in the site office.

Stockpile soil near the working face to assist with hot loads.

Basic Fire Safety

- Site will comply with local and state fire codes, including the placement and maintenance of fire extinguishers, smoke detectors, etc.
- See the Site Map (**Attachment 1**), identify Evacuation Routes, Fire Escape Routes, and Emergency Assembly Locations.
- Keep exit routes clear and well-marked.
- Cigarette, cigar, and/or pipe smoking are not allowed indoors in public places in Iowa. Make sure smoking materials are completely extinguished before entering the building. Never leave hot ashes or burning tobacco products unattended.
- Avoid using extension cords wherever possible, especially small-wired cords used with high-wattage appliances.
- Extension cords should not be run under rugs or hooked over nails.
- If a fuse blows (or a breaker "trips"), find the cause. Remove excess appliances (lamps, stereo components, space heaters, etc.) from a breaker circuit that frequently "trips."
- Discard food that has been exposed to heat, smoke, or soot.
- Do not discard damaged goods until after an inventory has been taken.
- Give first aid where appropriate.
- Stay out of damaged buildings.
- Return to the facility only when local fire authorities say it is safe.

Waste Materials

For materials that may become ignited:

- Call the General Manager. See **Attachment 2** for telephone number.
- If materials are in the working face and can be safely removed, remove and place near but not on, the working face, and extinguish. Use extreme caution if any attempt is made to control the fire.
- For small fires located outside of the working face, a fire extinguisher may be used.
- If a fire cannot be controlled by site personnel, report to the local Fire Department. See **Attachment 2** for telephone number.

Buildings and Site

Small Localized Fire – Building or Office

- Caution: A small-localized fire can engulf a room in less than 60 seconds.
- Act quickly. Smoke can be dangerous.
- Use a fire extinguisher to extinguish the flame; aim at the base of the flame.
- Remove nearby flammable materials such as paper, drapes, rags, etc.
- Evacuate all unnecessary personnel – go to the Emergency Assembly Location. In the event the Emergency Assembly Location is dangerous or inaccessible, proceed to the Secondary Emergency Assembly Location (See **Attachment 1**).
- If a fire cannot be controlled by site personnel, report to the local Fire Department. See **Attachment 2** for telephone number.

Out of Control Fire – Building or Office

- Get out of the building. Familiarize yourself with at least two exits from each room; for example, one window and one door.
- Go to the Emergency Assembly Location. In the event the Emergency Assembly Location is dangerous or inaccessible, proceed to the Secondary Emergency Assembly Location (See **Attachment 1**).
- Contact the local Fire Department from a mobile phone. See **Attachment 2** for telephone number.
- Never go back inside a building for any reason.

Household Hazardous Material Storage Buildings

The hazardous material storage building contains a pressurized dry chemical fire suppression system. The hazardous material storage building is equipped with explosion relief construction secondary spill containment, and explosion proof lighting system. In case of any size fire at the hazardous material storage building, the following individuals/companies must be contacted:

- Contact the Fire Department. See **Attachment 2** for telephone numbers.
- Notify the General Manager - See **Attachment 2** for telephone and mobile phone numbers.

If HHM in the hazardous storage building are on fire or are in immediate danger of being on fire, the following actions should be taken:

- Immediately evacuate the building and head to the Emergency Assembly Point (See **Attachment 1**).
- Activate alarm system following instruction in Section 113.30(4)c(8)1.

Equipment

Engine Fires

- Immediately turn off the ignition to shut down the fuel pump and the flow of fuel.
- Putting out an engine fire safely and efficiently takes two people. One holds the fire extinguisher and the other opens the hood. The fire will flare up as the fresh air hits it. Immediately spray the fire extinguisher across the base of the flames until the fire is out.
- It is important to get the hood open fast. If the fire burns through the hood release cable before you can get it open, there will be no way to get at the fire.
- Do not try to put out an engine fire by spraying the extinguisher through the radiator or through the wheel wells, this method will not work and will waste time and the fire extinguisher contents. Get at the base of the flames.
- If a fire cannot be controlled by site personnel, report to the local Fire Department. See **Attachment 2** for telephone number.
- The equipment will be thoroughly inspected and repaired, if necessary, prior to reuse.

MSW Shredder/Grinder Engine Fire

- Immediately turn off the ignition to shut down the fuel pump and the flow of fuel.

- If the fire is not near the fuel tank, attempt to extinguish the fire by use of a fire extinguisher. Immediately spray the fire extinguisher across the base of the flames until the fire is out. Make sure the MSW in the vicinity of the shredder/grinder is not burning or smoldering.
- If the fire is near the fuel tank, or is very large, vacate the area and call the Fire Department. See **Attachment 2** for phone numbers.

Fuels

General Safety

- Vapors from fuels can be more flammable than liquid, always use caution when filling vehicles or containers.
- Equipment shall be refueled only at designated locations.
- In case of spillage, filler caps shall be replaced, and spillage disposed of before engines are started.
- Engines shall be stopped and operators shall not be on the equipment during refueling operations.
- Only designated persons shall conduct fueling operations.
- Smoking and open flames shall be prohibited in areas used for fueling, fuel storage, or enclosed storage of equipment containing fuel.
- Liquid fuels not handled by pump shall be handled and transported only in portable containers or equivalent means designed for that purpose. Portable containers shall be plastic, have tight closures with screw or spring covers and shall be equipped with spouts or other means to allow pouring without spilling. Leaking containers shall not be used.

Fire Event

- If possible, turn off the pump or the nozzle distributing flammable liquid.
- Evacuate the area. Stay well clear of the above ground storage tank in case of explosion. Go to the Emergency Assembly Location (See **Attachment 1**).
- Call the Fire Department. See **Attachment 2** for telephone number.
- Call the General Manager. See **Attachment 2** for telephone number.

Utilities

Natural Gas and Propane Gas

- Call the Fire Department. See **Attachment 2** for telephone number.
- If the Emergency Assembly Point is a safe distance away, go to that site or go to the Secondary Emergency Assembly Point.
- Caution: Exploding tanks may eject pieces of the tank several hundred feet. These pieces can be lethal.
- The Fire Department may allow the tank to burn itself out.
- Call the General Manager (See **Attachment 2** for telephone and mobile phone numbers).

Electrical – Small Localized Fires

- Use a fire extinguisher rated Class C: Energized Electrical Equipment including Wiring, Fuse Boxes, Circuit Breakers, Machinery, and Appliances.

- Caution: A small-localized fire can engulf a room in less than 60 seconds.
- Act quickly.
- Remove nearby flammable materials such as paper, drapes, rags, etc.
- Evacuate all unnecessary personnel – go to the Emergency Assembly Location. In the event the Emergency Assembly Location is dangerous or inaccessible, proceed to the Secondary Emergency Assembly Location (See **Attachment 1**).

Electrical – Larger Uncontrolled Fires

- Get out of the building. Familiarize yourself with at least two exits from each room; for example, one window and one door.
- Go to the Emergency Assembly Location (See **Attachment 1**).
- Contact the Fire Department from a mobile phone. See **Attachment 2** for telephone number.
- Never go back inside a building for any reason.

Facilities

See Section 113.8(5)"b"(3)4 Buildings and Site. There are no additional facilities that have not been previously covered.

Working Area

Landfill fires can be started from several causes: spontaneous combustion, careless smoking, methane flash, and arson.

- Understand and be aware of warning signs.
- Always report any visible smoke to the General Manager.
- If in doubt about a possible fire or signs of fire call the Fire Department. See **Attachment 2** for telephone number.

Once a Fire is Identified

- Control access and site security.
- All persons must be required to sign in and out.
- Establish radio communications with firefighting, public safety, and Landfill personnel.
- First aid should be available on-site.
- Warning fences should be placed around any trenches dug as fire breaks.
- Safety meetings should be held daily.
- Spotters should be used to assist equipment operators.

Controlling a landfill fire may be accomplished through local firefighting equipment, or landfill firefighting experts may need to be contacted. Follow the instructions of the firefighting professionals on site.

- Excavated waste may require a hot pad where it can be spread and soaked with water or other fire extinguishing media.
- Soaked materials may require a cool pad storage area.
- Earthmoving equipment may be required to dig firebreaks down to bare earth or to build earthen dams.

Landfill stockpile fires can be started from several causes: spontaneous combustion, careless smoking, methane flash, lightning, and arson.

- Understand and be aware of warning signs.
- Always report any visible smoke to the General Manager. Some steam from composting piles and some other stockpiles may be normal due to the natural decomposition process. Report unusual levels of steam to the General Manager.
- If in doubt about a possible fire, call the Fire Department (See **Attachment 2** for emergency telephone numbers).
- Use caution while excavating "hot" materials, exposure to the air may create flames.
- Before attempting to excavate the "hot spot" within a stockpile, a spotter should watch equipment operators.
- Move "hot" materials to a hot pad so the materials can be sprayed with water or fire extinguishing media.

Unaffected stockpile materials and soaked stockpile materials should be moved to a cool pad while the remaining materials be excavated.

Hot Loads

Smoldering or ignited fires in a vehicle.

- "Hot loads" are loads of waste or vehicles that are smoking, smoldering, or are on fire. Hot loads may arrive at the facility without the driver aware of the risk.
- Do not dump hot loads on top of exposed waste of any kind.
- Do not stop a truck on fire or containing a hot load near a building.
- Quickly alert the driver and direct the truck toward a safe area.
- Call the Fire Department. See **Attachment 2** for telephone numbers.
- If the load can be dumped without harming the driver or others, dump the load in a safe area. Caution: A fire may spread quickly or "flash" as air is introduced.
- Use soil to place over smoldering or burning loads.
- Stay out of the "zone of danger," which is the cone-shaped area directly behind a vehicle with the gas tank located in the usual position at the back. If a gas tank explodes, it sends a tremendous blast out from the rear of the vehicle. This can be lethal for 50 to 100 feet behind the vehicle.

Waste Gases

- If you witness a flash fire potentially caused by methane, leave the area immediately. If the Emergency Assembly Location is a safe distance away, go to that site or go to the Secondary Emergency Assembly Location.
- See the Site Map (**Attachment 1**) with Evacuation Routes, Fire Escape Routes, and Emergency Assembly Locations.
- Call the Fire Department. See **Attachment 2** for telephone numbers.
- Contact the General Manager. See **Attachment 2** for telephone numbers.

Explosive Devices

- Use the alarm system and leave the area immediately. If the Emergency Assembly Point is a safe distance away, go to that site or go to the Secondary Emergency Assembly Point.
- See the Site Map (**Attachment 1**) with Evacuation Routes, Fire Escape Routes, and Emergency Assembly Locations.
- Call the Fire Department. See **Attachment 2** for telephone numbers.
- Contact the General Manager. See **Attachment 2** for telephone numbers.

113.8(5)"b"(3)5 Regulated Waste Spills and Releases

Waste Spills and Releases Terminology

- Regulated Waste – Generally includes non-hazardous material such as leachate, municipal solid waste, and petroleum contaminated soils.
- Spill – A spill primarily involves liquids or solids that are deposited accidentally on the facility's property in an incorrect location but remain within the facility's property boundary. Spills include quantities of 100 gallons or less, or two tons or less.
- Release – A release may involve spills of solids or liquids greater than 100 gallons or greater than two tons that enter lagoons, sedimentation ponds, drainage ways, etc., but stay on-site.
- Off-site Release – An off-site release is a release or spill that leaves the facility's property boundary. This section includes groundwater releases.

Waste Materials

Waste Materials Terminology

- Waste Materials – Waste materials are materials normally accepted at a landfill. Waste materials are also regulated wastes.
- On-Site Spill or Release – Use caution and remove the waste, placing it in an acceptable location, such as the working face, for proper disposal.
- Off-Site Spill or Release – If waste materials are identified beyond the property and/or waste materials are observed to be in a waterway, see Section 113.9(5)"b"(3)5.

Leachate

Lagoons

Leachate should not overflow the rim of the lined leachate collection lagoon or leak from a puncture or tear. If leachate should be observed overflowing or leaking from the leachate lagoon, actions should be taken to pump leachate into a tanker truck or other vehicle for transport to a Publicly Owned Treatment Works (POTW).

Generally, the leachate must be sampled and tested before the POTW will accept the material. Sampling and testing may take 24 to 72 hours or more.

- Contact the General Manager (See **Attachment 2** for telephone and mobile phone numbers).
- Call the State of Iowa (See **Attachment 2** for telephone numbers).

Drainage Systems

- Leachate should not overflow into a non-leachate designated drainage system from a seep or other event such as overflow from a leachate lagoon.
- If leachate is observed overflowing into a drainage system actions should be taken to stop the flow of leachate.
- Earthen dams could be constructed to divert the leachate.
- Contact the General Manager (See **Attachment 2** for telephone and mobile phone numbers).

Tanker Spills/Seeps/Miscellaneous Spills

Leachate from seeps and spills should not be allowed to flow beyond the Landfill property boundary and should not be allowed to enter a creek, river, or stream.

Leachate flows from seeps can often be temporarily diverted if the seep is excavated and recompacted.

Small leachate spills from tankers or other sources should be observed so they do not leave the property boundary. Absorbent materials, such as yard waste or compost, could be placed on the spill to minimize tracking.

Waste Gases

- Methane gas is a by-product of waste decomposition and can be explosive in specific concentrations. Methane gas is colorless and odorless; odor is emanated from other gases mixed with the methane.
- Methane gas can migrate and accumulate in enclosed buildings, under scales, crawl spaces, and other confined spaces.
- Methane gas concentration levels are often detected using an electronic meter.

If methane gas is detected within explosive limits:

- Extinguish all smoking.
- Attempt to ventilate the area by opening windows/doors.
- If the methane is detected in a scale house or other building regularly occupied, evacuate immediately and go to the Emergency Assembly Point (See **Attachment 1**).
- Contact the General Manager (See **Attachment 2** for telephone and mobile phone numbers).
- Contact the Fire Department (See **Attachment 2** for telephone and mobile phone numbers).
- Contact the DNR Field Office (See **Attachment 2** for telephone and mobile phone numbers).
- Do not return to the building until it has been properly ventilated and the concentrations have been checked with an electronic meter.

Waste Stockpiles and Storage Facilities

The facility does not have waste stockpiles or storage facilities.

Waste Transport Systems

This site does not have waste transport systems.

Litter and Airborne Particulate

Litter and airborne particulates will be controlled according to the sanitary disposal project permit.

Site Drainage System

If drainage systems are observed to be functioning improperly, contact the General Manager. See **Attachment 2** for telephone number.

Flood or Heavy Rain/Wet Situations:

- If regulated wastes enter drainage systems, use great caution removing the wastes – flowing water can have extreme force.
- Wet weather can cause embankments to become weakened and fail.

Non-Flood and Non-Heavy Rain/Wet Situations:

- Prevent the waste from washing away beyond the property boundary.
- Remove the wastes as soon as possible.

Off-Site Releases

Leachate

Leachate must be kept from entering creeks, rivers, streams, or other waterways. Leachate should not be allowed to leave the property boundaries.

If leachate is observed leaving the property boundary and/or entering a creek, river, stream, or other waterway, immediately contact the following:

- Contact the General Manager. See **Attachment 2** for telephone number.
- Contact the State of Iowa. See **Attachment 2** for telephone numbers.

Earthen dams, excavation, compaction, and other techniques can be applied to stop the flow of leachate from leaving the property boundary or traveling further from the property boundary.

Permanent drainage systems can be installed after the leachate flow has been diverted or stopped if a lagoon and leachate collection system is available.

Waste Gases

- If waste gases are detected outside of the property boundary, contact the General Manager.
- A second check of gas concentration levels with newly calibrated equipment may be required.
- If waste gases are detected a second time outside of the property boundary, then contact the DNR immediately (See **Attachment 2** for telephone numbers).

Regulated Waste

- Prevent the waste from traveling further off site. Earthen dams, excavation, compaction, and other techniques can be applied to stop the flow of regulated waste from traveling further from the property boundary.
- If the regulated waste is in a waterway, attempt to stop the flow of waste and if possible, stop the flow of waste downstream. Use caution working near steep banks or wet embankments.
- Contact the General Manager. See **Attachment 2** for telephone number.
- Contact the State of Iowa. See **Attachment 2** for telephone numbers.

Household Hazardous Materials

Household hazardous materials (especially material that has been bulked) must be kept from entering creeks, rivers, streams, or other waterways. Household hazardous materials should not be allowed to improperly leave the property boundaries.

Household hazardous materials that are released beyond the property and/or are observed to be in a waterway must be managed immediately.

- If possible, safely stop the source of the leak.
- Use absorbent material to stop material from entering the waterway or leaving the site.
- If household hazardous material is observed leaving the property boundary and/or entering a creek, river, stream, or other water, immediately contact the General Manager – See **Attachment 2** for telephone numbers.
- See **Attachment 3** – IDNR Spill Release as the type of spill will determine if the DNR must be contacted.

113.8(5)"b"(3)6 Hazardous Material Spills and Releases

- See **Attachment 3** for State Guidelines for Reporting Hazardous Conditions.
- Do not smoke. Do not create sparks.
- Be aware of the wind and avoid inhaling hazardous fumes.
- Use caution operating near hazardous materials. The material should be considered hazardous, even if the suspected material has not yet been confirmed hazardous by a professional.
- Do not let people or equipment make contact with liquids, dusts, or fumes of hazardous materials.
- Only trained professionals should attempt to clean up the hazardous materials.
- Do not come into contact with the hazardous material.
- Some hazardous materials can react violently with other chemicals and other materials - use extreme caution.

Load-Check Control Points

Load checking is performed periodically by landfills to identify banned materials, hazardous materials, and wastes that may have been generated from areas outside the solid waste planning boundaries.

If a solid waste load is identified as containing hazardous materials or hazardous markings on containers are identified, contact the following:

- See **Attachment 3** for reporting hazardous conditions to the State of Iowa.
- General Manager - See **Attachment 2** for telephone numbers.
- Observe the safety precautions outlined in Section 113.8(5)"b"(3)6 Hazardous Material Spill & Releases.

Mixed Waste Deliveries

See Section 113.8(5)"b"(3)6 Load-Check Control Points, above.

Fuels

Fuels and oils that are spilled can be absorbed with specific material designed for this purpose – they are often called "snakes," "booms," or "pillows." These materials, after use, are moved in drums to a used oil containment area until suitable transport to an off-site disposal location can be arranged.

If a fuel/oil spill occurs:

- Stop the flow of material if possible using valves or switches.
- Do not smoke.
- Do not pass vehicles over the spilled material, as these could be a spark/ignition source hazard.
- If possible, construct an earthen dam or similar structure to contain the spill.

Waste Gases

- If waste gases are detected outside of the property boundary, contact the General Manager. See **Attachment 2** for telephone numbers.
- A second check of gas concentration levels with newly calibrated equipment may be required.
- If waste gases are detected a second time outside of the property boundary, then contact the DNR immediately. See **Attachment 2** for telephone numbers.
- If waste gases are detected indoors, ventilate and evacuate the area.

HHM Waste Gas Event

- Attempt to ventilate the area by opening windows, doors, and ventilations systems as available.
- Do NOT use electrical fans to ventilate the area as sparks may ignite gases.
- Notify the General Manager. See **Attachment 2** for telephone numbers.
- Do not return to the building until the building has been properly ventilated.

Site Drainage Systems

This generally occurs during flood or heavy rain/flash flood situations.

If hazardous wastes enter drainage systems during flood/heavy rain/wet conditions:

- Contact 911.
- Contact the General Manager – See **Attachment 2** for telephone numbers.
- Contact the State of Iowa – See **Attachment 2** for telephone numbers.
- Emergency/Hazardous Material professionals will aid minimize the risk downstream.

If hazardous wastes enter drainage systems during non-flood/heavy rain/wet conditions:

- Prevent the waste from washing beyond the property boundary.
- Get assistance before attempting to remove the wastes.
- Assistance should be obtained from trained professionals.

Off-Site Releases

- Contact 911.
- If possible, construct an earthen dam or similar structure to reduce the spread of contamination. Do not contact the material, contaminated dust, fumes, or gases.
- Should a spill leave the property, staff will notify a hazardous material professional. The trained hazardous material professional will supply needed resources and take charge of the response effort.

In case of an off-site release, the following individuals must be contacted:

- General Manager - See **Attachment 2** for telephone and mobile phone numbers.
- Contact the State of Iowa - See **Attachment 2** for telephone numbers.
- See **Attachment 3** for reporting hazardous conditions to the State.

113.8(5)"b"(3)7 Mass Movement of Land and Waste

Earthquakes

During an Earthquake

- Duck, cover, and hold. If you are inside, crawl under a heavy piece of furniture and hold on or get under a doorframe.
- If you are outside, stay in an open area.
- If you are in your car or equipment, stop driving.

After an Earthquake

- Check for injuries.
- Get out of the building if it appears to be structurally unsound – do not re-enter the building. If the building is evacuated, go to the Emergency Assembly Point and account for Landfill personnel, contractors, guests, etc.
- Listen to a battery powered radio for further instructions.
- Be aware of broken glass and other sharp objects on the floor.
- Be aware of material above your head that might fall.
- Check water, gas, and electric lines for damage (natural gas odor) then see **Attachment 2** for information on utilities.

- Check leachate lagoons for leaks.
- Check stability of stockpiles and slopes. See Section 3.8.1.
- Check methane collection/venting systems.
- Do not use matches or smoke.
- Avoid the telephone.
- Do not go sightseeing.
- Expect aftershocks.
- Have the scale checked and re-certified by a qualified technician.

In case of earthquake, the following individuals must be contacted:

- General Manager – See **Attachment 2** for telephone and mobile phone numbers.

Check Fuel/Solvent Storage Systems

Extinguish all smoking and small flames.

- If a spill/leak exists, attempt to stop the leak/spill or absorb fuel/solvent with inert materials.
- If bulk fuel or solvent is leaking into the environment from a storage system, take immediate steps to limit flow into drainage ways by constructing an earthen dam.
- Report spills or leaks to the DNR. See **Attachment 2** for emergency contacts.

Slope Failure

Several dangers exist with slope failures including: exposing waste, leachate, bacteria, and other materials to the environment, allowing wastes to leave the site property, allowing wastes to enter wetlands or other regulated environments, and allowing wastes to overrun roads and buildings.

- Perform a head count of employees, contractors, and guests.
- Stay away from other nearby areas that may also be at risk.

Contact the following:

- General Manager – See **Attachment 2** for telephone numbers.
- Call 911 if there are any injuries or if someone may be buried under the failed slope.

Waste Shifts

Because of the instability of some stockpiles such as compost, some soils, and yard waste, the stockpile face should never be allowed to get higher than 15-20 feet. Borrow pits should also be constructed to ensure side slope stability.

- A professional engineer should be consulted to control side slope and stability.
- Use caution when excavating the “toe” of stockpile. Removing too much material may destabilize the upper portion of stockpile causing it to “slide” or fall down.
- In case of any stockpile slide, the following individuals/companies must be contacted: General Manager – See **Attachment 2** for telephone and mobile phone numbers.

- The DNR should be contacted for large slope failures when waste is exposed or if waste leaves the property boundary.

Waste Subsidence

Settling of large or small areas of the Landfill is a natural occurrence; however, sudden settling may cause changes in slope stability.

Waste subsidence is generally gradual. If a large sinkhole or other large depression is created from subsidence, stay away from the area as additional subsidence may occur.

Large depressions or holes should be reported to the General Manager.

113.8(5)"b"(3)8 Emergency and Release Notification and Reporting

Emergency reporting and notifications will be provided as needed by state, federal, and local authorities.

Federal Agencies

See **Attachment 2** for Emergency Contacts.

State Agencies

See **Attachment 2** for Emergency Contacts.

See **Attachment 3** for Reporting Hazardous Conditions.

County and City Agencies Including Emergency Management Services

See **Attachment 2** for Emergency Contacts.

News Media

See **Attachment 2** for Emergency Contacts.

Public and Private Facilities with Special Populations within Five Miles

See **Attachment 2** for a list of facilities and phone numbers.

Reporting Requirements and Forms

Emergency reporting requirements and forms will be provided as needed by the state, federal, and local authorities.

113.8(5)"b"(3)9 Emergency Waste Management Procedures

Communications

Communication between the Landfill and any emergency personnel will be at the direction of the General Manager if possible. The General Manager will also advise emergency personnel of factors that may influence the evacuation efforts or response procedures.

The following systems of communication may be used in an emergency.

- A telephone is available at the scale house.
- Cellular/digital telephones are not provided by the facility; however, personal cellular/digital telephones may be available.
- Two-way radios are available at some facilities.
- Honking horns can be used to indicate an emergency.
- Personal communication can also be used to communicate an emergency situation.

Alarm System

- The employer shall establish and educate employees regarding any proposed alarm system.
- An air horn or an automobile horn can be used to alert employees about a dangerous situation.
- Two-way or C.B. radios can be used to alert employees regarding a dangerous situation.
- If possible, person-to-person contact can be used to alert landfill guests, contractors, employees, etc. regarding the dangerous situation.

Temporary Discontinuation of Services – Short-Term and Long-Term

- If telephone service is discontinued, cellular or digital telephones can be used.
- The General Manager can dispatch messengers to deliver emergency messages in case of a discontinuation of normal communication systems.
- If the facility's transportation, processing, or landfilling services must be discontinued, the General Manager will contact member municipalities, county governments, and hauling companies as soon as possible to communicate rerouting instructions.

Facilities Access and Rerouting

- The General Manager will facilitate emergency rerouting.
- If access to the facility is blocked, telephone, radio, and person to person contact at the Landfill will be used to communicate new directions and rerouting.
- The General Manager will contact alternate disposal sites and arrange for disposal. After the emergency, normal disposal or transportation systems should resume as soon as possible.

Waste Acceptance

- The General Manager will contact alternate disposal sites and arrange for disposal if needed.

- After the emergency, normal disposal or transportation systems should resume as soon as possible.
- If wastes must be diverted for more than one day, contact the DNR; see **Attachment 2** for telephone numbers.

Waste in Process

- During an emergency, safety to human life is a priority.
- Wastes being tipped, processed, or handled must be left in place until the threat to human life is greatly reduced.
- If an emergency does not threaten human life, the General Manager will decide how best to manage wastes in process depending on the emergency circumstances.
- When the threat to human life is reduced, the waste should be processed according to the facility's permit.

113.8(5)"b"(3)10 Primary Emergency Equipment Inventory

Major Equipment

Heavy equipment and private vehicles are available on site for use in emergencies.

Fire Hydrants and Water Sources

Fire hydrants and water sources, if available, are located on the Site Plan Map (See **Attachment 1**).

Off-Site Equipment Resources

The facility may contact other municipal and county governments to borrow machinery until replacements can be acquired.

113.8(5)"b"(3)11 Emergency Aid

A commercial first-aid kit will be maintained at the Landfill office. The site supervisor or the staff will administer minor first-aid treatment when required. Serious injuries will be handled through 911 Emergency Services (See **Attachment 2**).

- In case of accidents occurring outside normal operating hours, it will be the responsibility of the senior staff person to provide first-aid treatment and to arrange for professional assistance if required.
- Call 911, professional emergency aid workers should be notified for injuries needing immediate first aid care.
- See **Attachment 2** for Emergency Contacts.
- General Manager should be notified of any injury (See **Attachment 2** for Emergency Contacts).

Responder Contacts

- Contact local 911 Emergency Services – See **Attachment 2** for telephone numbers.
- Contact the General Manager if any injury occurs – see **Attachment 2** for telephone numbers.

Medical Services

- Contact 911 before transporting sick or injured individuals in a personal vehicle or non-emergency vehicle.
- Directions to the Hospital are located in **Attachment 4**.

Contracts and Agreements

- The facility does not have any contracts or agreements for emergency aid.
- 911 service is provided to county businesses and businesses of incorporated cities.

113.8(5)"b"(3)12 ERRAP Training Requirements

During the first year, after the plan is approved by the DNR, existing and new employees will review the contents of the approved ERRAP with the training provider.

The General Manager should identify hazardous waste contractors that can service the facility in case hazardous materials are accidentally received.

Training Providers

The General Manager will serve as the training provider, will review the ERRAP with existing and new employees, and will provide any additional training required fulfilling the roles outlined in the ERRAP.

Employee Orientation

New employees are required to review the ERRAP and become familiar with the contents of ERRAP. **Attachment 2** (Emergency Contacts) will be provided to each employee.

Annual Training Updates

The General Manager will provide an annual review of the ERRAP with new and existing employees one time per year. New information will be reviewed at that time.

Training Completion and Record Keeping

Records of annual employee ERRAP training will be kept on file at the facility's offices.

Attachment 1

Site Plan Map

Emergency Evacuation Routes

Tornado Shelter

Emergency Assembly Point

Secondary Emergency Assembly Point

LEGEND

- BUILDING
- GRAVEL ROAD
- PAVED ROAD
- FENCELINE
- CULVERT
- EXISTING CELL BOUNDARY
- FUTURE CELL BOUNDARY
- EMERGENCY EVACUATION ROUTE

200 0 200

SCALE FEET

REV:	DATE	CK BY
0	-	-
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-

SHEET TITLE
EMERGENCY EVACUATION PLAN MAP ENLARGED

PROJECT TITLE
2025 LANDFILL PERMIT RENEWAL

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVE FORT MADISON, IA

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH: (515) 631-6160

PROJ. NO.	DWN. BY:	PROJ. MGR.	CLC
----	IAC		
	CHK. BY:		KDP
DSN. BY:	IAC		

CADD FILE:
GRRWA ERRAP MAP_V0.0.DWG

DATE:
4/21/25

DRAWING NO.
1A

G:\PROJECT\27225270.00\AUTOCAD\GRRWA ERRAP MAP_V0.0.DWG

Attachment 2

Emergency Phone Numbers

Telephone Locations
Fire
Medical
Landfill Management Notification
Media
State of Iowa
EPA
Utilities

GREAT RIVER REGIONAL WASTE AUTHORITY

EMERGENCY CONTACT LIST

TELEPHONE LOCATIONS

Location of Nearest Telephones ..... Scale House/Office

FIRE

Fire Department/Rescue 911

MEDICAL/DOCTOR

Ambulance 911

Hospital – Ft. Madison Community Memorial Hospital ..... (319) 372-6530

Estimated Drive Time ..... 10 minutes (8.1 miles)

Directions to Hospital/Clinic ..... See Attachment 4

LANDFILL MANAGEMENT – NOTIFICATION LIST

General Manager

Austin Banks ..... (319) 372-6140

Lead Operator

Derek Hamm ..... (319) 470-6221

MEDIA

Television:

KHQA – Quincy, IL ..... (217) 222-6200

KCRG – Cedar Rapids ..... (319) 399-5900

WHBF – Quad Cities ..... (309) 786-5441

Radio:

KOKX - Keokuk ..... (319) 524-5410

WQKQ – Fort Madison ..... (319) 752-5402

KGRS - Burlington ..... (319) 752-2701

News:

Fort Madison Daily Democrat ..... (319) 372-6421

EMERGENCY CONTACTS (CONT.)

STATE OF IOWA

Water Quality Bureau ..... (515) 423-6485

Environmental Protection Division ..... (319) 725-8694

DNR Field Office 6 in Washington, Iowa ..... (319) 653-2135

Iowa Emergency Management Division ..... (515) 725-3231

DNR Spill Response ..... (515) 725-8694 (24 hr)

EPA

Region 7 ..... (800) 223-0425

UTILITIES

Internet/Telephone:

McLeod USA ..... (319) 364-0000

Electricity:

Alliant Energy ..... (800) 255-4268

Water:

City of Fort Madison ..... (319) 372-1602

Natural Gas:

Mid-American Energy Co. ..... (888) 427-5632

Propane:

Win Propane. ..... (800) 728-2285

ENGINEER OF RECORD

SCS Engineers ..... (515) 631-6160

Attachment 3

Iowa Department of Natural Resources

Guidelines for Reporting Hazardous Conditions

Including Iowa Administrative Code Chapter 131

"Notification of Hazardous Conditions"

IOWA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL SERVICES DIVISION
FIELD SERVICES & COMPLIANCE BUREAU

Iowa Administrative Code Chapter 131
Notification of Hazardous Conditions

24 hour number for release reporting
515/725-8694

Summary of Key Points and Definitions

Definitions

"Hazardous Condition" means any situation involving the actual, imminent or probable spillage, leakage, or release of a hazardous substance onto the land, into a water of the state or into the atmosphere which, because of quantity, strength and toxicity of the hazardous substance, its mobility in the environment and its persistence, creates an immediate or potential danger to the public health or safety or to the environment.

"Hazardous Substance" means any substance or mixture of substance that presents a danger to the public health or safety and includes, but is not limited to, a substance that is toxic, corrosive, or flammable, or that is an irritant or that, in confinement, generates pressure through decomposition, heat, or other means. The following are examples of substances which, in sufficient quantity, may be hazardous: acids; alkalis; explosives; fertilizers; heavy metals such as chromium, arsenic, mercury, lead, and cadmium; industrial chemicals; paint thinners; paints; pesticides; petroleum products; poisons; radioactive materials; sludges; and organic solvents. "Hazardous substances" may include any hazardous waste identified or listed by the administrator of the United States Environmental Protection Agency under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976, or any toxic pollutant listed under Section 307 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous substance designated under Section 311 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous material designated by the secretary of transportation under the Hazardous Materials Transportation Act (49 CFR 172.101)

Key Points

Who is Required to Report Hazardous Conditions. Any person manufacturing, storing, handling, transporting, or disposing of a hazardous substance shall notify the department at (515) 725-8694 and the local police department or the office of the sheriff of the affected county of the occurrence of a hazardous condition as soon as possible but not later than six hours after the onset of the hazardous condition or the discovery of the hazardous condition. A sheriff or police chief who has been notified of a hazardous condition shall immediately notify the department. Reports made pursuant to this rule shall be confirmed in writing as provided in 131.2(2).

Reporting Subsequent Findings. All subsequent finding and laboratory results should be reported and submitted in writing to the department as soon as they become available.

Reminder ~ VERBAL REPORTS ARE REQUIRED WITHIN 6 HOURS OF INCIDENCE OCCURRENCE OR DISCOVERY.

REV. 5/2024

IOWA DNR EMERGENCY RESPONSE UNIT
6200 Park Avenue, Ste 200 / DES MOINES, IOWA 50321
515-725-8694 TDD 515-242-5967 www.iowadnr.gov

IOWA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL SERVICES DIVISION
FIELD SERVICES & COMPLIANCE BUREAU

Guidelines for Reporting Hazardous Conditions
Verbal Reporting

24 hour number for release reporting
515/725-8694

Report the Condition if:

- ☐ The hazardous substance has the potential to leave the property by run-off, sewers, tile lines, culverts, drains, utility lines, or some other conduit, or,
- ☐ The hazardous substance has the potential to reach a water of the state – either surface water or groundwater or,
- ☐ The hazardous substance can be detected in the air at the boundaries of the facility property by the senses (sight and smell) or by monitoring equipment or,
- ☐ There is a potential threat to the public health and safety or,
- ☐ Local officials (Fire department, law enforcement, Hazmat, public health, and emergency management) respond to the incident or,
- ☐ The release exceeds a Federal Reportable Quantity (RQ).

~ If in Doubt, Report It ~

IDNR REQUIRES VERBAL REPORTS WITHIN 6 HOURS OF INCIDENCE OCCURRENCE OR DISCOVERY

- It is recommended that all spills be cleaned up although a particular spill may not be reportable. A series of small spills over time can result in one big cleanup.
- Department rules stress the immediate or potential danger that a spill may cause.
- A written report of the Hazardous Condition is required within 30 days of the verbal notification.

*In general, Iowa reporting requirements are more stringent than Federal reporting requirements. However, the **time limit** for reporting at the Federal level is more immediate.*

IOWA DNR EMERGENCY RESPONSE UNIT
6200 Park Avenue, Ste 200 / Des Moines, IOWA 50321
515-725-8694 TDD 515-242-5967 www.iowadnr.gov

IOWA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL SERVICES DIVISION
FIELD SERVICES & COMPLIANCE BUREAU

Guidelines for Reporting Hazardous Conditions Written Report Requirements

24 hour number for release reporting 515/725-8694

The Iowa Department of Natural Resources
Requires a written report of any Hazardous Condition.
(VERBAL REPORT REQUIRED WITHIN 6 HOURS)

Written Report. The written report of such a hazardous condition shall be submitted to the department within 30 days and contain the following information:

a. The exact location of the hazardous condition.
b. The time and date of onset or discovery of the hazardous condition.
c. The name of the material, the manufacturer's name, and the volume of each material involved in the hazardous condition in addition to contaminants within the material if they by themselves could cause a hazardous condition.
d. The medium (land, water, or air) in which the hazardous condition occurred or exists.
e. The name, address, and telephone number of the party responsible for the hazardous condition.
f. The time and date of the verbal report to the department of the hazardous condition.
g. The weather conditions at the time of the hazardous condition onset of discovery.
h. The name, mailing address, and telephone number of the person reporting the hazardous condition.
i. The name and telephone of the person closest to the scene of the hazardous condition who can be contacted for further information and action.
j. Any other information, such as the circumstances leading to the hazardous condition, visible effects, and containment measures taken that may assist in the proper evaluation by the department.

The written report should include the IDNR Spill Number (assigned at the time of the verbal report) and be addressed to the duty officer responding to the spill. Reports can be sent via mail, fax, or electronic mail to the addresses listed below.

Mail	Fax	E-Mail
Iowa DNR Field Services Emergency Response 6200 Park Ave. Ste 200 Des Moines, IA 50321	515/725-8201	Emergency_Response@dnr.iowa.gov

CHAPTER 131
NOTIFICATION OF HAZARDOUS CONDITIONS

[Prior to 7/1/83, DEQ Ch 41]
[Prior to 12/3/86, Water, Air and Waste Management[900]]

Chapter rescission date pursuant to Iowa Code section 17A.7: 1/1/28

567—131.1(455B) Definitions. For purposes of this chapter:

"Corrosive" means causing or producing visible destruction or irreversible alterations in human skin tissue at the site of contact, or in the case of leakage of a hazardous substance from its packaging, causing or producing a severe destruction or erosion of other materials through chemical processes.

"Department" means the department of natural resources.

"Hazardous condition" means any situation involving the actual, imminent or probable spillage, leakage, or release of a hazardous substance onto the land, into a water of the state or into the atmosphere which, because of the quantity, strength and toxicity of the hazardous substance, its mobility in the environment and its persistence, creates an immediate or potential danger to the public health or safety or to the environment.

"Hazardous substance" means any substance or mixture of substances that presents a danger to the public health or safety and includes, but is not limited to, a substance that is toxic, corrosive, or flammable, or that is an irritant or that, in confinement, generates pressure through decomposition, heat, or other means. The following are examples of substances which, in sufficient quantity, may be hazardous: acids; alkalis; explosives; fertilizers; heavy metals such as chromium, arsenic, mercury, lead and cadmium; industrial chemicals; paint thinners; paints; pesticides; petroleum products; poisons; radioactive materials; sludges; and organic solvents. "Hazardous substances" may include any hazardous waste identified or listed by the administrator of the United States Environmental Protection Agency under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act of 1976, or any toxic pollutant listed under Section 307 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous substance designated under Section 311 of the federal Water Pollution Control Act as amended to January 1, 1977, or any hazardous material designated by the secretary of transportation under the Hazardous Materials Transportation Act (49 CFR §172.101).

"Irritant" means a substance causing or producing dangerous or intensely irritating fumes upon contact with fire or when exposed to air.

"Toxic" means causing or producing a dangerous physiological, anatomic or biochemical change in a biological system.

567—131.2(455B) Report of hazardous conditions. Any person manufacturing, storing, handling, transporting, or disposing of a hazardous substance shall notify the department at (515)281-8694 and the local police department or the office of the sheriff of the affected county of the occurrence of a hazardous condition as soon as possible but not later than six hours after the onset of the hazardous condition or discovery of the hazardous condition. A sheriff or police chief who has been notified of a hazardous condition shall immediately notify the department. Reports made pursuant to this rule shall be confirmed in writing as provided in 131.2(2).

131.2(1) *Verbal report.* The verbal report of such a hazardous condition should provide information on as many items listed in 131.2(2) as available data will allow.

131.2(2) *Written report.* The written report of such a hazardous condition shall be submitted to the department within 30 days and contain the following information:

a. The exact location of the hazardous condition.

b. The time and date of onset or discovery of the hazardous condition.

c. The name of the material, the manufacturer's name and the volume of each material involved in the hazardous condition in addition to contaminants within the material if they by themselves could cause a hazardous condition.

d. The medium (land, water or air) in which the hazardous condition occurred or exists.

e. The name, address and telephone number of the party responsible for the hazardous condition.

f. The time and date of the verbal report to the department of the hazardous condition.

g. The weather conditions at the time of the hazardous condition onset or discovery.

h. The name, mailing address and telephone number of the person reporting the hazardous condition.

i. The name and telephone number of the person closest to the scene of the hazardous condition who can be contacted for further information and action.

j. Any other information, such as the circumstances leading to the hazardous condition, visible effects and containment measures taken that may assist in proper evaluation by the department.

131.2(3) *Reporting of subsequent findings.* All subsequent finding and laboratory results should be reported and submitted in writing to the department as soon as they become available.

These rules are intended to implement Iowa Code section 455B.115.

[Filed 2/3/78, Notice 10/5/77—published 2/22/78, effective 3/29/78]
[Filed emergency 10/31/80—published 11/26/80, effective 10/31/80]
[Filed emergency 6/3/83—published 6/22/83, effective 7/1/83]
[Filed emergency 11/14/86—published 12/3/86, effective 12/3/86]
[Filed 12/30/93, Notice 10/13/93—published 1/19/94, effective 2/23/94]

Attachment 4

Directions to Hospital/Clinic

11 min (8.1 miles)

via US-61 S

Fastest route, the usual traffic

Great River Regional Waste Authority
2092 303rd Ave, Fort Madison, IA 52627

- Get on US-61 S from 303rd Ave
  3 min (1.7 mi)
- Follow US-61 S to IA-2 E/US-61 BUS. Take exit 18 from US-61 S
  5 min (5.4 mi)
- Continue on US-61 BUS to your destination in Fort Madison
  3 min (0.9 mi)

Southeast Iowa Regional Medical Center Fort Madison Campus
5445 Avenue O, Fort Madison, IA 52627

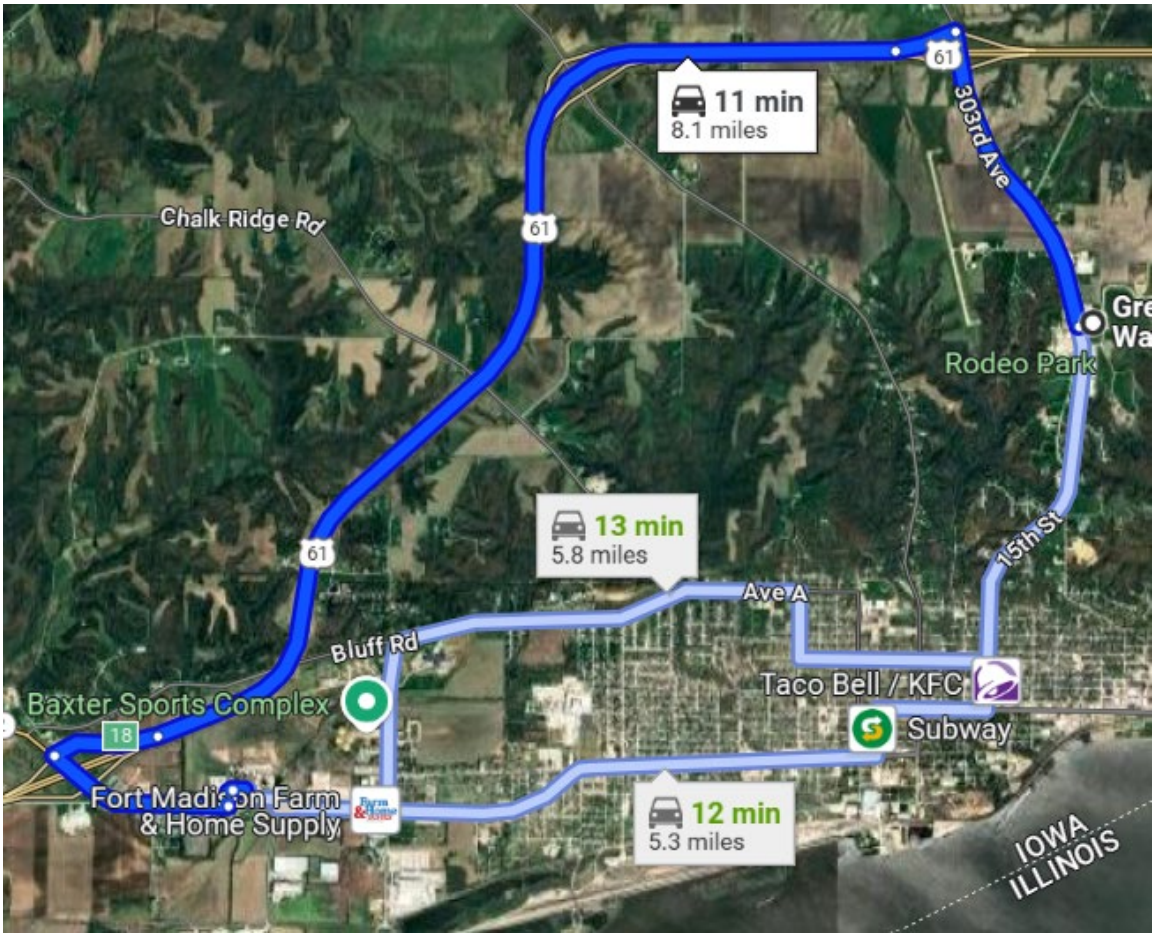
Southeast Iowa Regional Medical Center

Fort Madison Campus

5445 Avenue O

Fort Madison, IA 52627

(319) 372-6530



Attachment 5

Special Populations Within Five Mile Radius

SPECIAL POPULATIONS WITHIN 5-MILE RADIUS

HOSPITALS

Fort Madison Community Hospital, 5445 Avenue O, Fort Madison, IA ..... (319) 372-6530

NURSING HOMES/ASSISTED LIVING

Ft. Madison Health Center, 1702 41st Street, Fort Madison, IA ..... (319) 372-8021
River Valley Place, 5025 River Valley Rd, Ft. Madison IA ..... (319) 372-8611
The Kensington, 2210 Ave H, Ft. Madison, IA ..... (319) 372-4233
Birkwood Village, 1702 41st St, Ft. Madison, IA ..... (319) 372-8021
Inhance Corporation, 609 8th St, Ft. Madison, IA ..... (319) 372-4920
Newberry Center, 728 Avenue G, Ft. Madison, IA ..... (319) 372-3147

SCHOOLS

Fort Madison Elementary/Middle School, 502 48th St., Fort Madison, IA ..... (319 372-4687
Fort Madison High School, 2001 Avenue B, Fort Madison, IA ..... (319)-372-1862
Holy Trinity High School, 2600 Avenue A, Fort Madison, IA ..... (319)-372-2486
Lincoln Elementary School, 1326 Avenue E, Fort Madison, IA ..... (319) 372-2896
SE Community College, 712 6th St., Fort Madison, IA ..... (319) 376-2286

DAY CARE CENTERS

Early Childhood Center, 2213 Avenue J, Ft. Madison, IA ..... (319) 372-6428
Little Friends FM Childcare, 2134 Avenue I, Fort Madison, IA .....(319) 372-4907
Carousel Preschool, 719 Ave F, Ft. Madison, IA ..... (319) 372-1424
Wonder Years Learning Center, 3712 Avenue L, Fort Madison, IA ..... (319) 372-8000
Holy Trinity Early Childhood, 2213 Avenue J, Fort Madison, IA..... (319) 372-6428
Head Start, 1020 34th St., Ft. Madison, IA ..... (319) 372-5462

Appendix C

Modifications to Design Plans and Specifications

Modifications to Design Plans and Specifications

Prepared For:
Great River Regional Waste Authority
2092 303rd Avenue
Fort Madison, IA 52627

Permit No. 56-SDP-07-80

SCS ENGINEERS

Project No. 27225270.00 | November 2025

1690 All-State Court, Suite 100
West Des Moines, IA 50265
515-631-6160

Table of Contents

Section Page

Attachments

1.0 GROUNDWATER UNDERDRAIN

1.1 BACKGROUND

The permit amendment request dated April 9, 2024 (Doc# 109782) proposed a revised groundwater underdrain trench system for Cells R3-2 through R3-6. This system was subsequently approved by IDNR on April 10, 2024 (Doc# 109789). Due to the addition of the berm on the west side of Cell R3-4, the regrading of Cell R3-7 from a 2% southernly slope to a 2% NE Slope, and the planned conversion of the Cell R3-7 blanket-type underdrain system to a trench-type system to match Cells R3-2 through R3-6, a revision to the underdrain system was required. GRRWA is requesting a permit amendment to update the groundwater underdrain system.

1.2 GROUNDWATER MODEL

This updated groundwater model used the same previous assumptions, equations, model, and initial contours previously submitted under Doc# 109782 and approved under Doc# 109789.

The liner system generally slopes downward at 2%, while also draining toward central collection lines at 2%, resulting in a 2.83% compound slope. The proposed underdrain system in this report uses cell base perimeter trenches (interim and final) to intercept groundwater in the vicinity of and below the liner system. An extension of the perimeter trench would be installed with each new cell construction event, resulting in the underdrain grid shown **Sheet C3.0** in **Attachment 1**.

Steady-state groundwater elevations and resulting flows into the underdrain system were estimated using the 3-dimensional groundwater modeling software, AnAqSim© (Analytical Aquifer Simulator) developed by Dr. Charlie Fitts. AnAqSim© utilizes the subdomain method, which is an analytic element method. The modeling of the collection trenches beneath Cells R3-2 through R3 7 used line sinks with specified hydraulic heads along the proposed trench alignment.

Input

The groundwater table elevations developed for the simulation utilized the head-specified boundary conditions and existing contours used in the previous modeling. This model also utilized the same hydraulic conductivity of 2.1×10^{-6} ft/sec (1.81×10^{-1} ft/day) as the previously submitted and approved model.

To simulate the dewatering of the area beneath the footprints of Cells R3-2 through R3-7 using a trench system to lower the water table to 5' or more below the bottom of the waste, head-specified line sinks were used to determine the discharge of a groundwater underdrain system below the basal portion of the cells. A line sink on the southern edge of the expansion area was not required, as the highest elevation of the groundwater in that area is already lower than would be required. The line sinks were generally placed along the edges of individual cells or the inside toe of the side slope of the perimeter cell boundaries. Additionally, Cell R3-4, Cell R3-5, and Cell R3-6 have a mid-cell line sink (line sinks 26, 20, and 23, respectively). The line sink layout is shown on **Sheet C3.0** in **Attachment 1**. The vertices of the line sinks were placed at grade breaks and changes in flow direction. The discharge required to achieve these head-specified line sink elevations was considered to be the minimum capacity of the system.

Results

The flow rate (discharge rate) of each line sink was computed by AnAqSim©. When modeling the full build-out of the modeled portion of the north expansion (Cells R3-2 through R3-7), the calculated total estimated flow rate required to lower and maintain the 5-foot separation of groundwater from the bottom of waste was 31,130 ft^3/day or approximately 162 gallons per minute.

1.3 GROUNDWATER UNDERDRAIN TRENCHES

The trenches will be a minimum of 2 feet wide to allow for excavation and placement of the drainage aggregate. The design dimensions of the groundwater underdrain trenches are proposed as follows:

- Trench aggregate width = Minimum of 2 feet
- Trench aggregate depth = Minimum of 2 feet
- Piping depth = 6 inches above the bottom of the trench

The alignment and typical cross-section detail of the proposed groundwater underdrain trench system are shown on **Detail 5, Sheet C5.0** in **Attachment 1**.

The groundwater flowing into the trench of the underdrain system will be conveyed via a 6-inch perforated HDPE SDR 11 pipe. Until the construction of R3-6, the central collection trench will convey the collected groundwater to the sump, which then will pump the groundwater up to the surface stormwater ditch. Construction of Cell R3 6 will move the sump to the south end of the east perimeter trench. Groundwater will be conveyed to the sump by extending the central collection trench to the east perimeter trench, which will then convey the groundwater to the south. The slope along with the amount of groundwater collected by each pipe is included in **Table 1** in **Attachment 3** shows the location and elevations of these elements, as well as the flow direction of each pipe.

Aggregate

The minimum required permeability for the drainage trench aggregate was determined to be $4.99x10^{-1}$ cm/sec from the previously submitted report. This calculated permeability used a higher inflow per day per foot than any of the currently modeled line sinks, indicating that this permeability would be a conservative choice for the current design.

Pipe Sizing

As previously mentioned, the pipe used in the proposed underdrain collection system is a 6-inch diameter perforated HDPE SDR 11. The sizing of this pipe was based on Line sink 1 as it has the highest flow due to being the final conveyance of the water collected by the system. This pipe flow calculation can be found in **Attachment 3**. A summary of the collected water, along with the conveyed water can also be found in this attachment in **Table 2**.

2.0 HELP MODEL

2.1 HELP MODEL SUMMARY

567 Iowa Administrative Code (IAC) 113.7(5)"b"(3) requires that the leachate collection system be designed and constructed to maintain less than one-foot depth of leachate over the liner. The method used to make this demonstration is to employ the use of the U.S. Environmental Protection Agency's Hydrologic Evaluation of Landfill Performance (HELP) Model, version 4.0.1 The information input into the HELP model represents conditions likely to result in a higher leachate generation rate, and therefore a higher head on the liner. To ensure conservation the model was ran for intermediate cover conditions, this condition consisted of 5 layers, a 2-foot thick intermediate cover material, waste layer, 1-foot thick sand drainage layer, FML liner, and a 2-foot thick compacted clay layer.

Temperature and precipitation data was synthetically generated using the HELP models built in WGEN generator using the coordinates provided from the model based on the landfills zip code. The design inputs included the site specific liner geometry of cell R3-7, and waste thicknesses provided in the HELP model submitted under Doc # 96922. HELP Model simulations were conducted for the Cell R3-7 for the proposed liner configuration by dividing the overall cell into 3 models, Upper slope, Low Slope, and Bottom of Cell. The Upper, steep slope (100 feet at 34%) represents the sideslope of Cell R3-7. The Model run for this slope indicated that 2,482 cubic feet per acre per year of leachate was collected by the drainage layer, which is equivalent of 0.68 inch/ac/yr (Output: Upper Slope).

Similarly, the lower slope (170 feet at 2.86%) was analyzed to determine the amount of leachate collected by the drainage layer, and the subsequent head on the liner. Based on design the leachate generated in the upper slope would flow into the lower slope area. To account for this the leachate generated in the upper slope (0.68 inch/acre/year) was input as a subsurface inflow into the low slope area. The HELP model simulation for this indicated that the peak head over the liner in the lower slope area was 6.00 Inches. The average yearly collected amount was 1.36 inches per acre per year, or 4,951 cubic feet per acre per year (Output: Low Slope).

The bottom of cell (315 feet at 3.08%) was analyzed to determine the head on liner and amount of leachate collected between the two leachate collection lines. As the area is located between two collection lines it can be assumed that no subsurface inflow would occur. The model indicated that a maximum head of 8.26 inches. The average yearly collected amount was 0.68 Inches per year, or 2,481 Cubic feet per acre per year (Output: Bottom of Cell).

2.2 SAND

The granular leachate collection media (sand) must be at least 1 foot thick and have a minimum permeability of 2×10^{-2} cm/sec. The HELP Model indicated that the annual average and daily maximum head over the liner for a 100-year simulation, with no recirculation, is less than the 12-inch maximum. The referenced HELP Model output files are provided in **Attachment 4**.

2.3 LEACHATE RECIRCULATION

567 IAC 113.7(5)"b"(4) requires that, to qualify for leachate recirculation activities, the leachate collection system must be designed and constructed factoring in leachate recirculation. For the analysis, the HELP Model calculations were based on a 90% recirculation rate. The model showed that less than 12 inches of fluid would be present over the liner over a period of 100 years. The resulting peak head with recirculation for the low slope area with inflow was 4.56 Inches, and 9.83 Inches for the bottom of cell. The HELP model output files are named Low Slope with Recirculation and Bottom of Cell with Recirculation, respectively. Actual field conditions and any variation from the assumptions used in the HELP model would impact the conclusions and timeframe indicated by the model. Based on these results, leachate recirculation appears to be feasible and GRRWA requests approval to recirculate leachate in Cell R3-7. The referenced HELP Model files are provided in Attachment 4

Attachment 1

Plan Sheets

GREAT RIVER REGIONAL WASTE AUTHORITY
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

PREPARED FOR

GRRWA
GREAT RIVER REGIONAL WASTE AUTHORITY

GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

PREPARED BY

SCS ENGINEERS

1690 ALL-STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
(515) 631-6160 FAX (913) 681-0012

PROJECT NO. 27225435.00

Solid Waste Permit No. 56-SDP-07-80

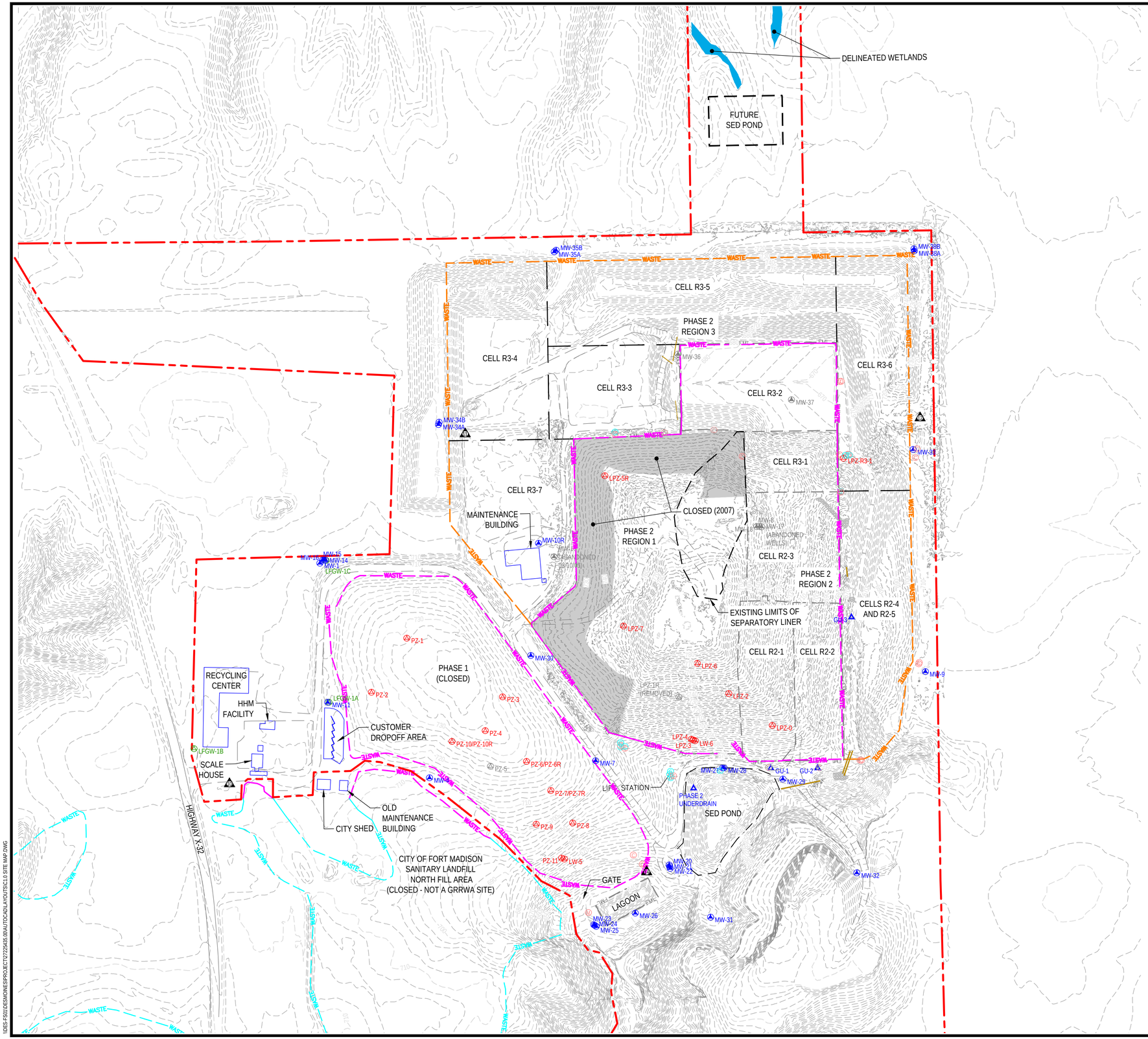
NOVEMBER 2025

Sheet List Table	
Sheet Number	**Sheet Title**
C0.0	Cover
C1.0	Site Map
C3.0	Groundwater Underdrain System
C3.1	Proposed Liner Grades
C3.2	Leachate Collection System
C3.3	Proposed Top of Waste Grades
C5.0	Liner and Leachate Collection System Details
C5.1	Sideslope Riser and Sump Details
C5.2	Containment Pad Details
C5.3	Phasing Details
C5.4	Phasing Details
C5.5	Phasing Details
C5.6	Phasing Details

REFERENCE: 2023 GOOGLE EARTH AERIAL

SCALE: 1"=2000'

ISSUED FOR REVIEW



DRAWING SET LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPERTY BOUNDARY
- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
- EXISTING CELL BOUNDARY
- EXISTING FML BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING PERFORATED LEACHATE COLLECTION PIPE
- EXISTING SOLID LEACHATE COLLECTION PIPE
- EXISTING LEACHATE PIPE CLEANOUT
- EXISTING LEACHATE VALVE
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE LIFT STATION
- EXISTING LEACHATE EXTRACTION WELL
- EXISTING LEACHATE PIEZOMETER (LPZ-1)
- EXISTING PERFORATED GROUNDWATER UNDERDRAIN PIPE
- EXISTING SOLID GROUNDWATER UNDERDRAIN PIPE
- EXISTING GROUNDWATER UNDERDRAIN CLEANOUT
- EXISTING GROUNDWATER UNDERDRAIN VALVE
- EXISTING GROUNDWATER UNDERDRAIN MANHOLE
- EXISTING GROUNDWATER UNDERDRAIN LIFT STATION
- GROUNDWATER UNDERDRAIN DISCHARGE POINT (GU-1)
- MONITORING WELL (MW-1)
- ABANDONED MONITORING WELL (MW-1)
- CULVERT
- SURVEY CONTROL POINT
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED CELL BOUNDARY
- PROPOSED UNPAVED ROAD
- PROPOSED PERFORATED LEACHATE COLLECTION PIPE
- PROPOSED SOLID LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE PIPE CLEANOUT
- PROPOSED PERFORATED GROUNDWATER UNDERDRAIN PIPE
- PROPOSED SOLID GROUNDWATER UNDERDRAIN PIPE
- PROPOSED GROUNDWATER UNDERDRAIN CLEANOUT

SURVEY CONTROL POINTS			
NUMBER	NORTHING	EASTING	ELEVATION
CP10	245789.41	2246188.31	715.95
CP11	247214.36	2247147.97	716.17
CP12	247280.52	2249001.37	714.40
CP13	244620.85	2249100.71	708.81
CP14	245430.98	2247886.89	646.91
CP15	243782.97	2247345.72	702.00

NOTES:

1. EXISTING SURFACE CONTOURS ON THIS SHEET ARE A COMPOSITE OF TOPOGRAPHICAL SURVEY INFORMATION FROM STEGER CONSTRUCTION DATED AUGUST 5 2024, TOPOGRAPHIC SURVEY INFORMATION FROM BENZING SURVEYING DATED AUGUST 15 2023, AND HISTORICAL SURVEY INFORMATION FROM BARKER LEMAR ENGINEERING CONSULTANTS.

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SHEET TITLE: SITE MAP

PROJECT TITLE: GRRWA SANITARY LANDFILL FUTURE PHASE DESIGN MODIFICATIONS

CLIENT: GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

PROJ. NO.: 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

CADD FILE: C1.0 SITE MAP.DWG

DATE: 11/17/25

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FUTURE SED POND

GROUNDWATER UNDERDRAIN CLEANOUT (SEE DETAIL 2/C5.0)

GROUNDWATER UNDERDRAIN CLEANOUT (SEE DETAIL 2/C5.0)

GROUNDWATER UNDERDRAIN CLEANOUT (SEE DETAIL 2/C5.0)

GROUNDWATER UNDERDRAIN CLEANOUT (SEE DETAIL 2/C5.0)

GROUNDWATER UNDERDRAIN CLEANOUT (SEE DETAIL 2/C5.0)

SIDESLOPE RISER TO CONTAINMENT PAD/LEACHATE HEADER (SEE DETAILS SHEETS C5.1 AND C5.2)

SIDESLOPE RISER TO CONTAINMENT PAD/LEACHATE HEADER (SEE DETAILS SHEETS C5.1 AND C5.2)

PHASE 2 REGION 3

PHASE 2 REGION 1

PHASE 2 REGION 2

PHASE 1 (CLOSED)

CELL R3-5

CELL R3-4

CELL R3-3

CELL R3-2

CELL R3-1

CELL R3-6

CELL R3-7

CELL R2-3

CELL R2-1

CELL R2-2

CELLS R2-4 AND R2-5

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FL. 691.00

FL. 690.67

FL. 691.50

FL. 694.96

FL. 703.23

FL. 699.00

FL. 704.99

FL. 684.65

FL. 686.21

FL. 688.24

FL. 674.80

FL. 674.06

FL. 668.83

FL. 662.50

FL. 660.20

FL. 659.40

FL. 661.11

FL. 658.60

FL. 657.78

FL. 657.05

FL. 680.64

FL. 642.38

MW-35B
MW-35A

MW-34B
MW-34A

MW-10R

MW-30

MW-7

MW-4

MW-27
MW-28

MW-29

MW-9

MW-33

MW-32

MW-20
MW-21
MW-22

MW-10
MW-14
MW-13
LFGW-1C

LFGW-1A
MW-11

LFGW-1B

GU-1
GU-2
GU-3
GU-4
GU-5

LPZ-5R
LPZ-7
LPZ-6
LPZ-1R (REMOVED)
LPZ-2
LPZ-0
LPZ-4
LPZ-3
W-5
LPZ-670-1

PZ-1
PZ-2
PZ-3
PZ-4
PZ-10/PZ-10R
PZ-6/PZ-6R
PZ-7/PZ-7R
PZ-9
PZ-8
PZ-11
LW-5

RECYCLING CENTER

HHM FACILITY

SCALE HOUSE

CUSTOMER DROPOFF AREA

OLD MAINTENANCE BUILDING

CITY SHED

LIFT STATION

PHASE 2 UNDERDRAIN

SED POND

HIGHWAY X-32

CITY OF FORT MADISON SANITARY LANDFILL NORTH FILL AREA (CLOSED - NOT A GRRWA SITE)

DRAWING SET LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPERTY BOUNDARY
- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
- EXISTING CELL BOUNDARY
- EXISTING FML BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING PERFORATED LEACHATE COLLECTION PIPE
- EXISTING SOLID LEACHATE COLLECTION PIPE
- EXISTING LEACHATE PIPE CLEANOUT
- EXISTING LEACHATE VALVE
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE LIFT STATION
- EXISTING LEACHATE EXTRACTION WELL
- EXISTING LEACHATE PIEZOMETER
- EXISTING PERFORATED GROUNDWATER UNDERDRAIN PIPE
- EXISTING SOLID GROUNDWATER UNDERDRAIN PIPE
- EXISTING GROUNDWATER UNDERDRAIN CLEANOUT
- EXISTING GROUNDWATER UNDERDRAIN VALVE
- EXISTING GROUNDWATER UNDERDRAIN MANHOLE
- EXISTING GROUNDWATER UNDERDRAIN LIFT STATION
- GROUNDWATER UNDERDRAIN DISCHARGE POINT
- MONITORING WELL
- ABANDONED MONITORING WELL
- CULVERT
- SURVEY CONTROL POINT
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED CELL BOUNDARY
- PROPOSED UNPAVED ROAD
- PROPOSED PERFORATED LEACHATE COLLECTION PIPE
- PROPOSED SOLID LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE PIPE CLEANOUT
- PROPOSED PERFORATED GROUNDWATER UNDERDRAIN PIPE
- PROPOSED SOLID GROUNDWATER UNDERDRAIN PIPE
- PROPOSED GROUNDWATER UNDERDRAIN CLEANOUT

NOTES:

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SHEET TITLE
GROUNDWATER UNDERDRAIN SYSTEM

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

PROJ. NO.: 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

CADD FILE:
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DATE:
11/17/25

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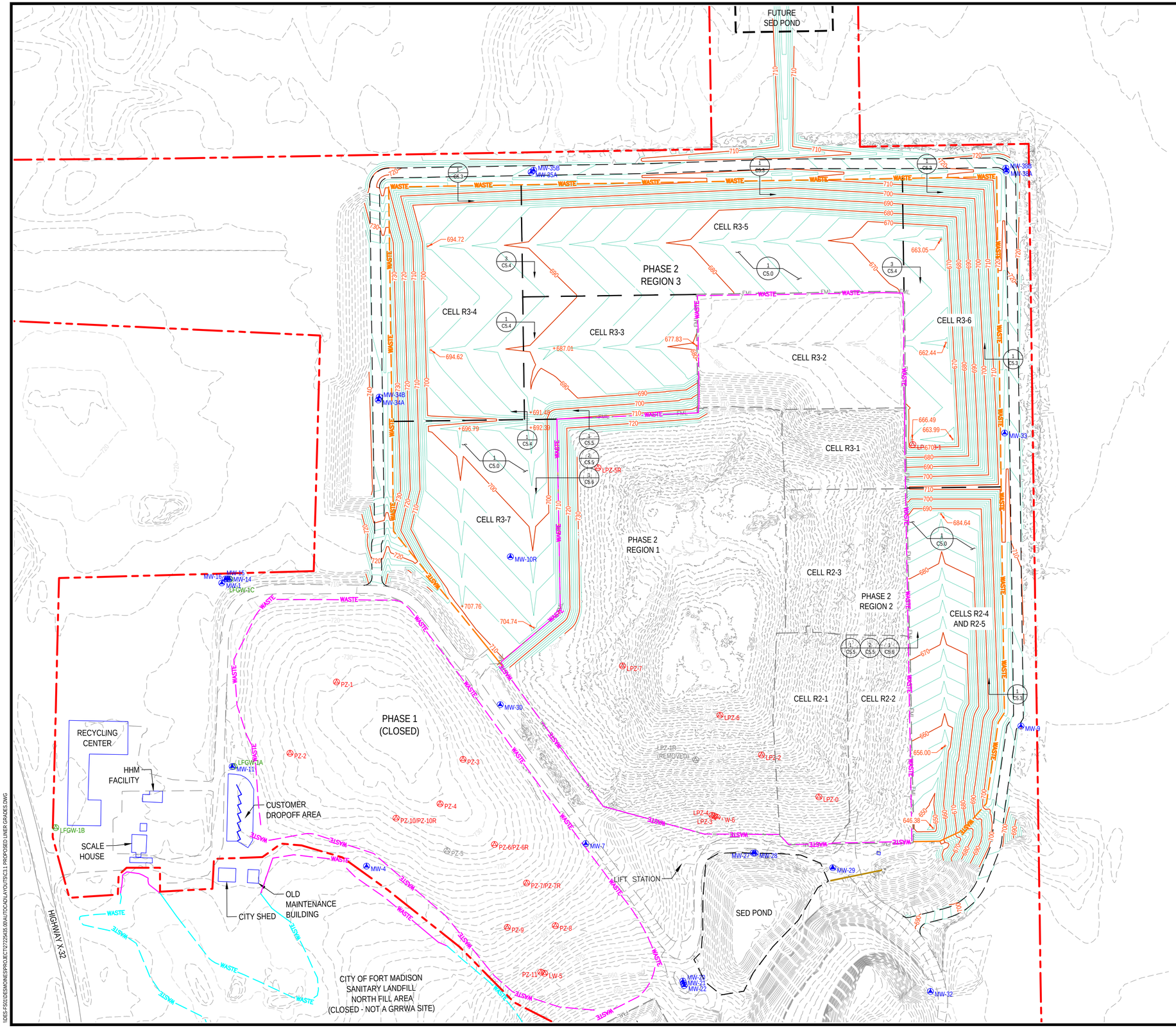

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- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
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- EXISTING FML BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
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- EXISTING SOLID LEACHATE COLLECTION PIPE
- EXISTING LEACHATE PIPE CLEANOUT
- EXISTING LEACHATE VALVE
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE LIFT STATION
- LEW-1 EXISTING LEACHATE EXTRACTION WELL
- LPZ-1 EXISTING LEACHATE PIEZOMETER
- EXISTING PERFORATED GROUNDWATER UNDERDRAIN PIPE
- EXISTING SOLID GROUNDWATER UNDERDRAIN PIPE
- EXISTING GROUNDWATER UNDERDRAIN CLEANOUT
- EXISTING GROUNDWATER UNDERDRAIN VALVE
- EXISTING GROUNDWATER UNDERDRAIN MANHOLE
- EXISTING GROUNDWATER UNDERDRAIN LIFT STATION
- GU-1 GROUNDWATER UNDERDRAIN DISCHARGE POINT
- MW-1 MONITORING WELL
- MW-1 ABANDONED MONITORING WELL
- CULVERT
- SURVEY CONTROL POINT
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED CELL BOUNDARY
- PROPOSED UNPAVED ROAD
- PROPOSED PERFORATED LEACHATE COLLECTION PIPE
- PROPOSED SOLID LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE PIPE CLEANOUT
- PROPOSED PERFORATED GROUNDWATER UNDERDRAIN PIPE
- PROPOSED SOLID GROUNDWATER UNDERDRAIN PIPE
- PROPOSED GROUNDWATER UNDERDRAIN CLEANOUT

NOTES:

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2. EXISTING SURFACE CONTOURS ON THIS SHEET ARE A COMPOSITE OF TOPOGRAPHICAL SURVEY INFORMATION FROM STEGER CONSTRUCTION DATED AUGUST 5 2024, TOPOGRAPHIC SURVEY INFORMATION FROM BENZING SURVEYING DATED AUGUST 15 2023, AND HISTORICAL SURVEY INFORMATION FROM BARKER LEMAR ENGINEERING CONSULTANTS.

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SHEET TITLE
PROPOSED LINER GRADES

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

PROJ. NO. 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

CADD FILE:
C3.1 PROPOSED LINER GRADES.DWG

DATE:
11/17/25

DRAWING NO.
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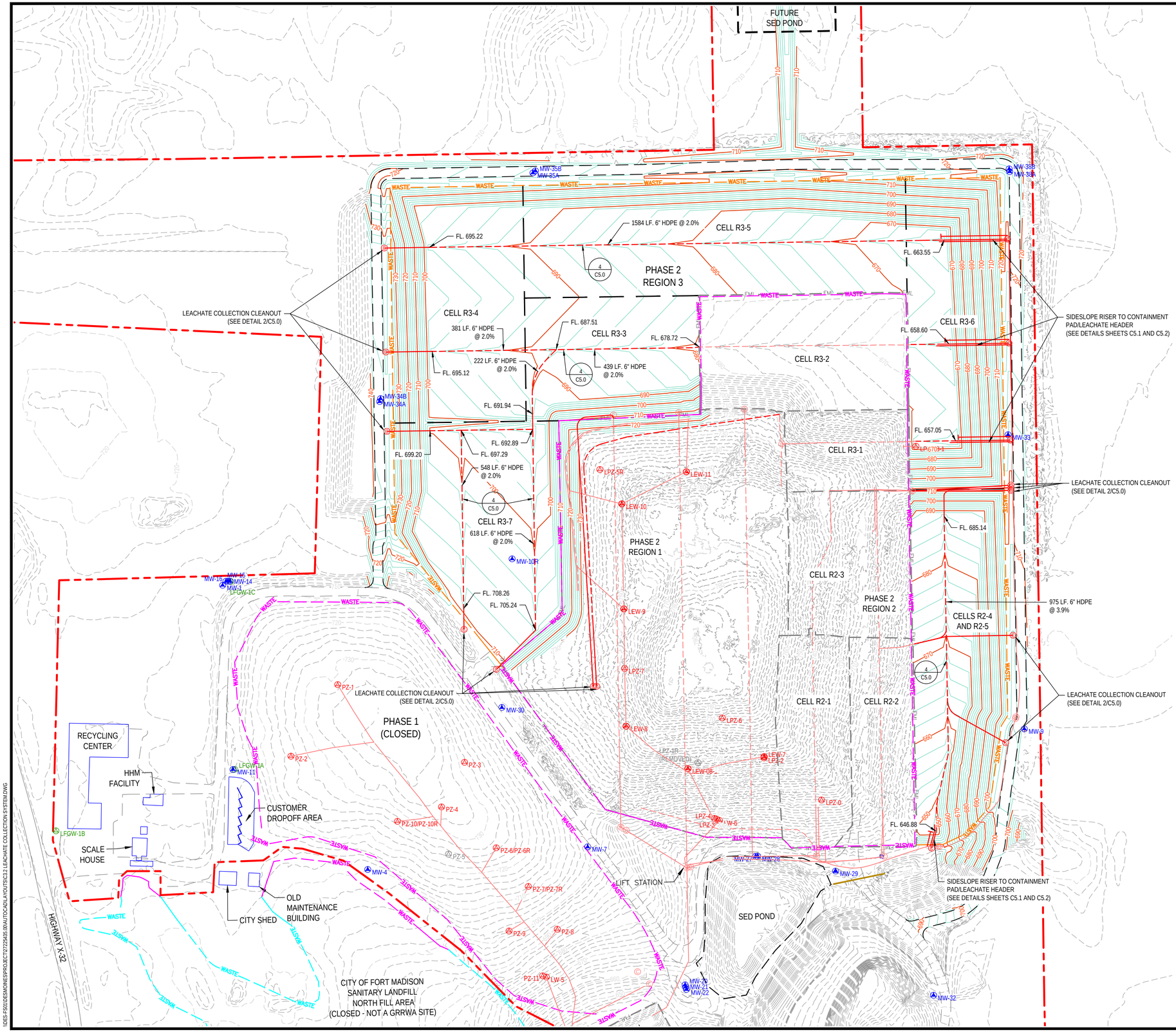

DRAWING SET LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPERTY BOUNDARY
- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
- EXISTING CELL BOUNDARY
- EXISTING FML BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING PERFORATED LEACHATE COLLECTION PIPE
- EXISTING SOLID LEACHATE COLLECTION PIPE
- EXISTING LEACHATE PIPE CLEANOUT
- EXISTING LEACHATE VALVE
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE LIFT STATION
- LEW-1 EXISTING LEACHATE EXTRACTION WELL
- LPZ-1 EXISTING LEACHATE PIEZOMETER
- EXISTING PERFORATED GROUNDWATER UNDERDRAIN PIPE
- EXISTING SOLID GROUNDWATER UNDERDRAIN PIPE
- EXISTING GROUNDWATER UNDERDRAIN CLEANOUT
- EXISTING GROUNDWATER UNDERDRAIN VALVE
- EXISTING GROUNDWATER UNDERDRAIN MANHOLE
- EXISTING GROUNDWATER UNDERDRAIN LIFT STATION
- GU-1 GROUNDWATER UNDERDRAIN DISCHARGE POINT
- MW-1 MONITORING WELL
- MW-1 ABANDONED MONITORING WELL
- CULVERT
- SURVEY CONTROL POINT
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED CELL BOUNDARY
- PROPOSED UNPAVED ROAD
- PROPOSED PERFORATED LEACHATE COLLECTION PIPE
- PROPOSED SOLID LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE PIPE CLEANOUT
- PROPOSED PERFORATED GROUNDWATER UNDERDRAIN PIPE
- PROPOSED SOLID GROUNDWATER UNDERDRAIN PIPE
- PROPOSED GROUNDWATER UNDERDRAIN CLEANOUT

NOTES:

1. PROPOSED CONTOURS REPRESENT DESIGNED TOP OF LINER WITHIN THE PROPOSED CELL BOUNDARIES AND DESIGNED TOP OF GROUND OUTSIDE OF THE PROPOSED CELL BOUNDARIES. CONTOUR INTERVAL: 10' MAJOR, 2' MINOR.
2. EXISTING SURFACE CONTOURS ON THIS SHEET ARE A COMPOSITE OF TOPOGRAPHICAL SURVEY INFORMATION FROM STEGER CONSTRUCTION DATED AUGUST 5 2024, TOPOGRAPHIC SURVEY INFORMATION FROM BENZING SURVEYING DATED AUGUST 15 2023, AND HISTORICAL SURVEY INFORMATION FROM BARKER LEMAR ENGINEERING CONSULTANTS.

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SCALE FEET

ISSUED FOR REVIEW

REV.	DATE	CK. BY
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SHEET TITLE: LEACHATE COLLECTION SYSTEM

PROJECT TITLE: GRRWA SANITARY LANDFILL FUTURE PHASE DESIGN MODIFICATIONS

CLIENT: GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

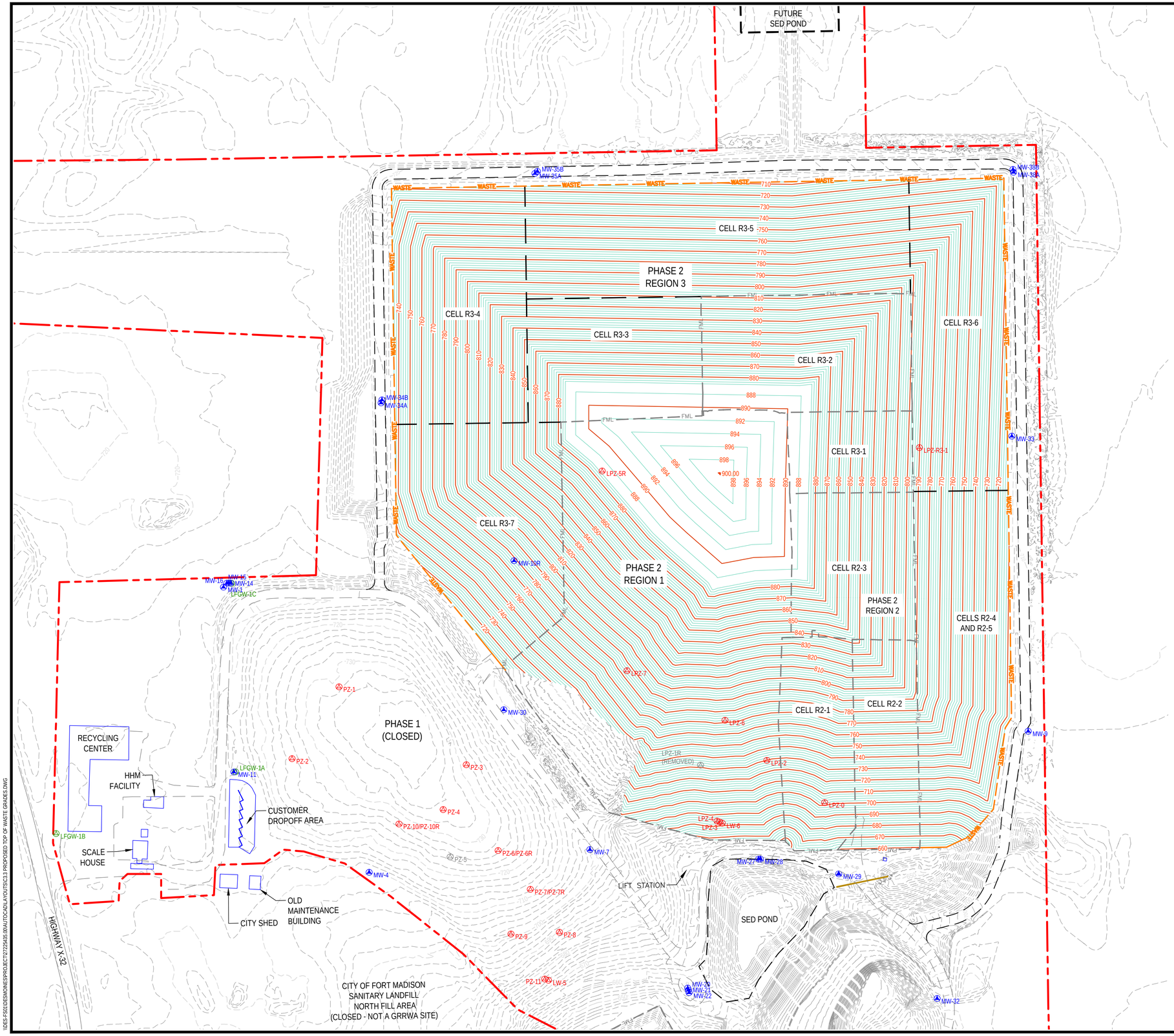
PROJ. MGR	CLC
DWN. BY: CTC	CHK. BY: TCB
PROJ. NO.: 27225435.00	DSN. BY: CTC

CADD FILE: C3.2 LEACHATE COLLECTION SYSTEM.DWG

DATE: 11/17/25

DRAWING NO.: C3.2

\\DES-FS01\DESMOINES\PROJECT\27225435.00\AUTOCAD\LAYOUTS\C3.2 LEACHATE COLLECTION SYSTEM.DWG



DRAWING SET LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPERTY BOUNDARY
- FUTURE WASTE BOUNDARY
- EXISTING WASTE BOUNDARY
- APPROXIMATE WASTE BOUNDARY (FORT MADISON LANDFILL, PDC TECHNICAL SERVICES)
- EXISTING CELL BOUNDARY
- EXISTING FML BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING PERFORATED LEACHATE COLLECTION PIPE
- EXISTING SOLID LEACHATE COLLECTION PIPE
- EXISTING LEACHATE PIPE CLEANOUT
- EXISTING LEACHATE VALVE
- EXISTING LEACHATE MANHOLE
- EXISTING LEACHATE LIFT STATION
- LEW-1 EXISTING LEACHATE EXTRACTION WELL
- LPZ-1 EXISTING LEACHATE PIEZOMETER
- EXISTING PERFORATED GROUNDWATER UNDERDRAIN PIPE
- EXISTING SOLID GROUNDWATER UNDERDRAIN PIPE
- EXISTING GROUNDWATER UNDERDRAIN CLEANOUT
- EXISTING GROUNDWATER UNDERDRAIN VALVE
- EXISTING GROUNDWATER UNDERDRAIN MANHOLE
- EXISTING GROUNDWATER UNDERDRAIN LIFT STATION
- GU-1 GROUNDWATER UNDERDRAIN DISCHARGE POINT
- MW-1 MONITORING WELL
- MW-1 ABANDONED MONITORING WELL
- CULVERT
- SURVEY CONTROL POINT
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- PROPOSED CELL BOUNDARY
- PROPOSED UNPAVED ROAD
- PROPOSED PERFORATED LEACHATE COLLECTION PIPE
- PROPOSED SOLID LEACHATE COLLECTION PIPE
- PROPOSED LEACHATE PIPE CLEANOUT
- PROPOSED PERFORATED GROUNDWATER UNDERDRAIN PIPE
- PROPOSED SOLID GROUNDWATER UNDERDRAIN PIPE
- PROPOSED GROUNDWATER UNDERDRAIN CLEANOUT

NOTES:

1. PROPOSED CONTOURS REPRESENT DESIGNED TOP OF WASTE GRADING. CONTOUR INTERVAL: 10' MAJOR, 2' MINOR.
2. EXISTING SURFACE CONTOURS ON THIS SHEET ARE A COMPOSITE OF PROPOSED GRADING OUTSIDE OF THE CELL LIMITS, TOPOGRAPHICAL SURVEY INFORMATION FROM STEGER CONSTRUCTION DATED AUGUST 5 2024, TOPOGRAPHIC SURVEY INFORMATION FROM BENZING SURVEYING DATED AUGUST 15 2023, AND HISTORICAL SURVEY INFORMATION FROM BARKER LEMAR ENGINEERING CONSULTANTS.

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SCALE FEET

ISSUED FOR REVIEW

REV.	DATE	CK. BY
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SHEET TITLE
PROPOSED TOP OF WASTE GRADES

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

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1690 ALL STATE COURT, SUITE 100
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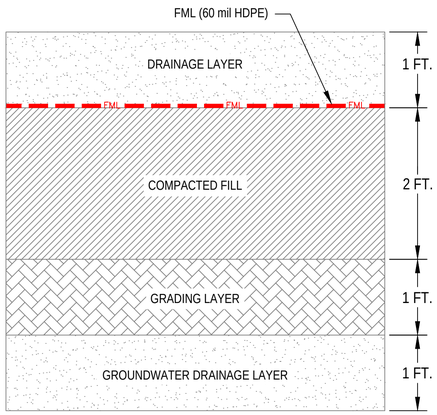
PROJ. NO.	DWN. BY:	PROJ. MGR
27225435.00	CTC	CLC
DSN. BY:	CHK. BY:	
CTC	TCB	

CADD FILE:
C3.3 PROPOSED TOP OF WASTE GRADES.DWG

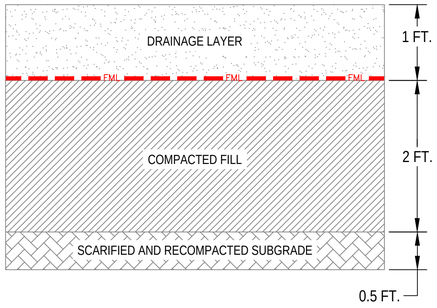
DATE:
11/17/25

DRAWING NO.
C3.3

\\DES-FS01\DES\MOINES\PROJECTS\27225435.00\AUTOCAD\LAYOUTS\C3.3 PROPOSED TOP OF WASTE GRADES.DWG

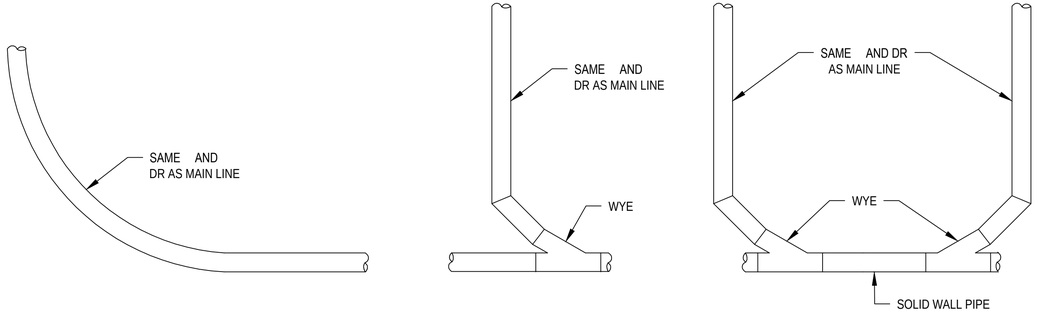


CELLS R2-4 AND R2-5



CELLS R3-3, R3-4. R3-5, R3-6, AND R3-7

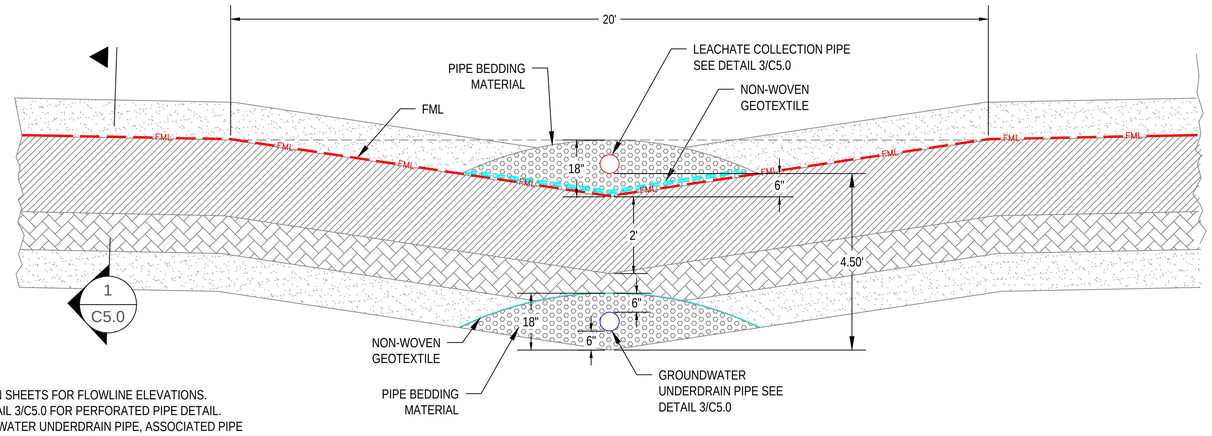
1 LINER AND LEACHATE COLLECTION DETAIL
NOT TO SCALE



NOTES:
1) CLEANOUTS SHALL EXTEND 3 FEET ABOVE GRADE AND CAPPED WITH VENTED CAPS (NON-PRESSURIZED LINES) OR THREADED/FLANGED & BOLTED (PRESSURIZED LINES).
2) CLEANOUTS SHALL INCLUDE A 30 DEGREE TO 45 DEGREE WYE AND SWEEP USING 22.5 DEGREE OR LESS SEGMENTS.
3) ALL CLEANOUTS SHALL BE LABELED WITH WEATHER RESISTANT MARKINGS

2 TYPICAL CLEANOUT DETAIL
NOT TO SCALE

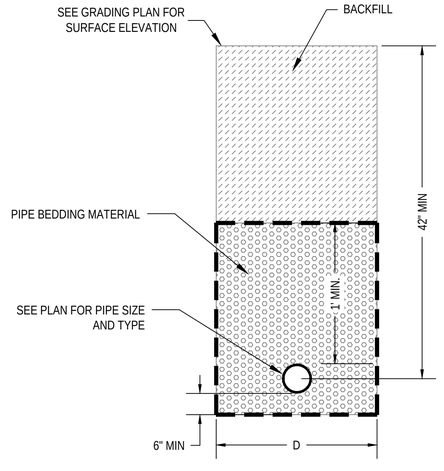
3 PERFORATED PIPE DETAIL
NOT TO SCALE



NOTES:

1) SEE PLAN SHEETS FOR FLOWLINE ELEVATIONS.
2) SEE DETAIL 3/C5.0 FOR PERFORATED PIPE DETAIL.
3) GROUNDWATER UNDERDRAIN PIPE, ASSOCIATED PIPE BEDDING AND GEOTEXTILE, AND GROUNDWATER DRAINAGE LAYER APPLIES ONLY TO CELLS R2-4 AND R2-5.
4) SPECIFICATIONS AND GEOTEXTILE REQUIREMENTS SHALL BE PREPARED PRIOR TO CONSTRUCTION.

4 LEACHATE AND GROUNDWATER COLLECTION TRENCH
NOT TO SCALE



PIPE (IN)	D (FT.)
2	1.5
4	1.5
6	1.5-1.65
8	1.5-1.85
10	1.5-2.0

NOTES:

1. THIS DETAIL DEPICTS THE CONSTRUCTION OF THE TRENCH-STYLE GROUNDWATER UNDERDRAIN SYSTEM IN CELLS R3-3, R3-4, R3-5, R3-6, & R3-7 AS WELL AS THE LEACHATE HEADER TO THE EAST OF CELL R3-6.
2. GEOTEXTILE NOT REQUIRED FOR SOLID PIPE BURIAL OUTSIDE WASTE BOUNDARY

5 FLEXIBLE OR SEMI-RIGID PIPE TRENCH DETAIL
NOT TO SCALE

ISSUED FOR REVIEW

REV.	DATE	CK. BY
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SHEET TITLE
LINER AND LEACHATE COLLECTION SYSTEM DETAILS

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
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PH. (515) 631-6160

PROJ. MGR	CLC
DWN. BY:	CTC
CHK. BY:	TCB
PROJ. NO.	27225435.00
DSN. BY:	CTC

CADD FILE: C5.0 DETAILS.DWG

DATE: 11/14/25

DRAWING NO.
C5.0

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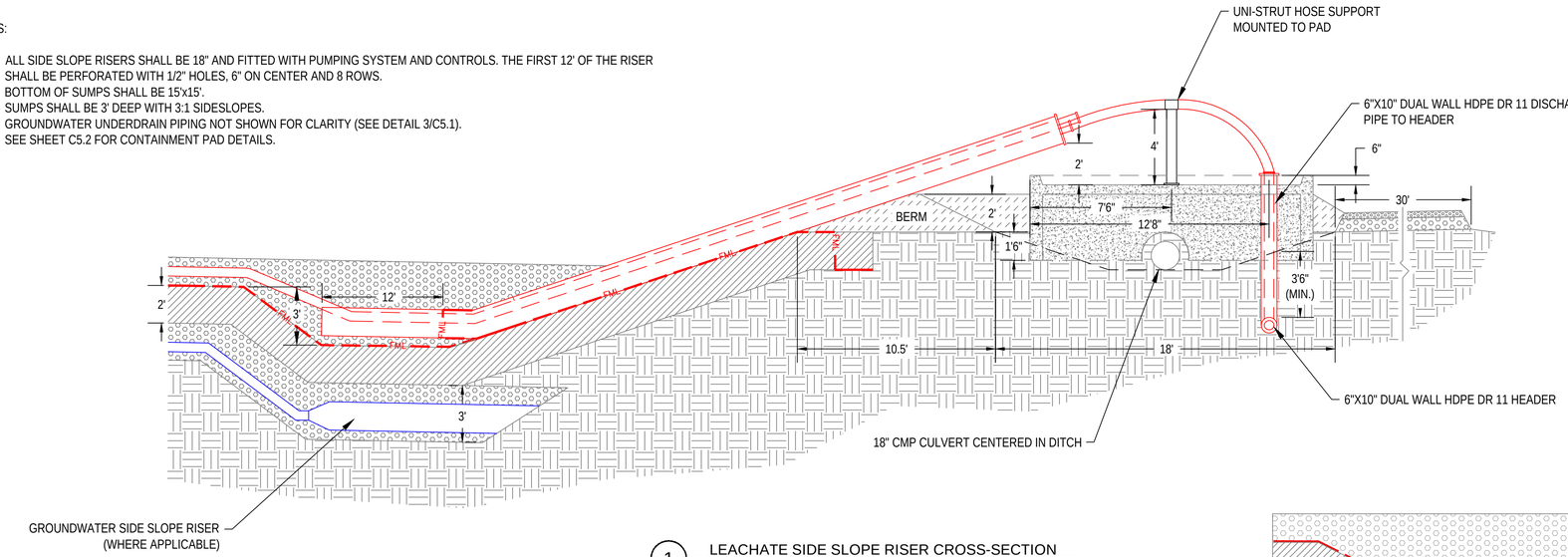
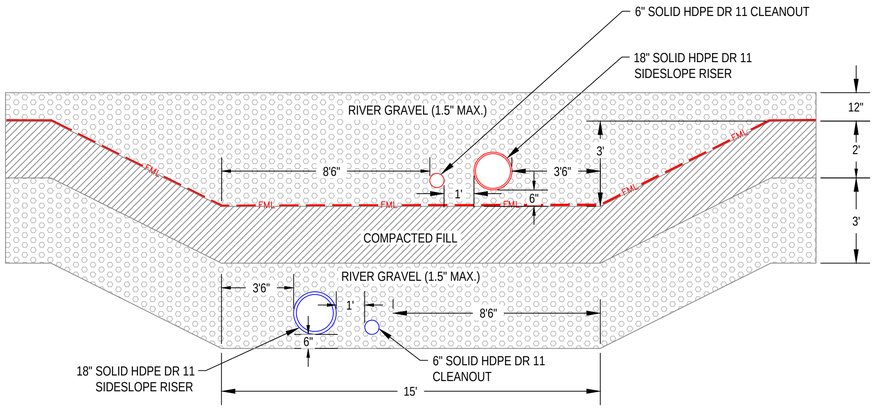
NOTES:

1) ALL SIDE SLOPE RISERS SHALL BE 18" AND FITTED WITH PUMPING SYSTEM AND CONTROLS. THE FIRST 12' OF THE RISER SHALL BE PERFORATED WITH 1/2" HOLES, 6" ON CENTER AND 8 ROWS.
2) BOTTOM OF SUMPS SHALL BE 15'x15'.
3) SUMPS SHALL BE 3' DEEP WITH 3:1 SIDESLOPES.
4) GROUNDWATER UNDERDRAIN PIPING NOT SHOWN FOR CLARITY (SEE DETAIL 3/C5.1).
5) SEE SHEET C5.2 FOR CONTAINMENT PAD DETAILS.



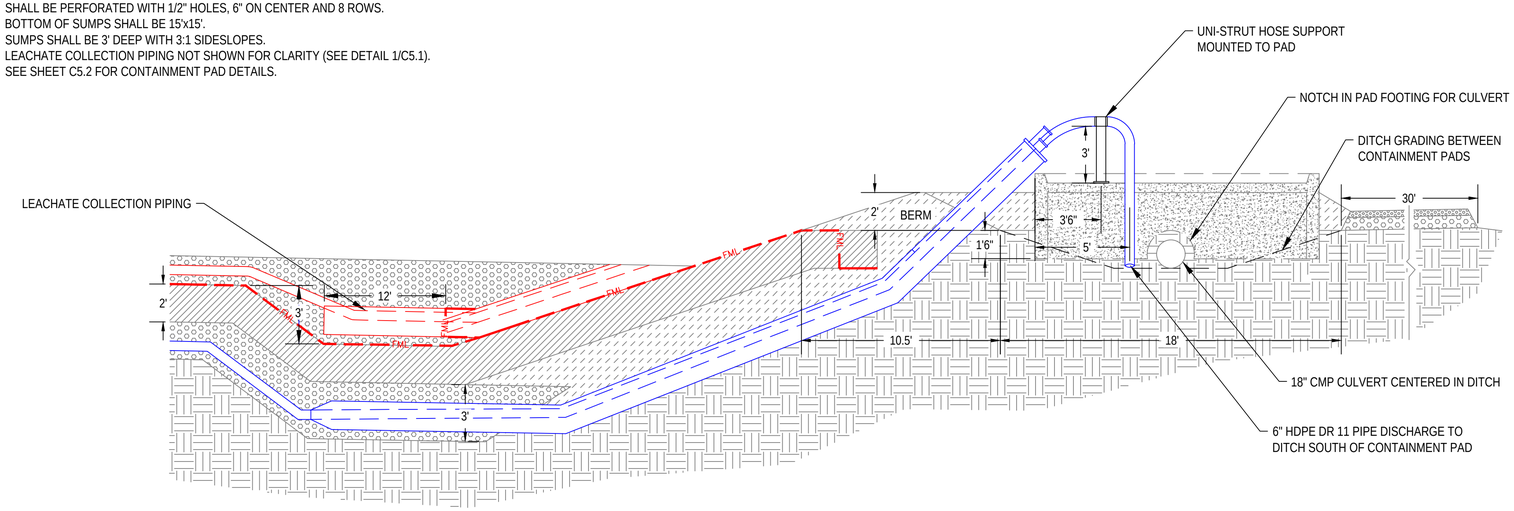
1 LEACHATE SIDE SLOPE RISER CROSS-SECTION
NOT TO SCALE



2 SIDE SLOPE RISER AND CLEANOUT SUMP SECTION
NOT TO SCALE

NOTES:

1) ALL SIDE SLOPE RISERS SHALL BE 18" AND FITTED WITH PUMPING SYSTEM AND CONTROLS. THE FIRST 12' OF THE RISER SHALL BE PERFORATED WITH 1/2" HOLES, 6" ON CENTER AND 8 ROWS.
2) BOTTOM OF SUMPS SHALL BE 15'x15'.
3) SUMPS SHALL BE 3' DEEP WITH 3:1 SIDESLOPES.
4) LEACHATE COLLECTION PIPING NOT SHOWN FOR CLARITY (SEE DETAIL 1/C5.1).
5) SEE SHEET C5.2 FOR CONTAINMENT PAD DETAILS.



3 GROUNDWATER UNDERDRAIN SIDE SLOPE RISER CROSS-SECTION
NOT TO SCALE

ISSUED FOR REVIEW

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SHEET TITLE
SIDESLOPE RISER AND SUMP DETAILS

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

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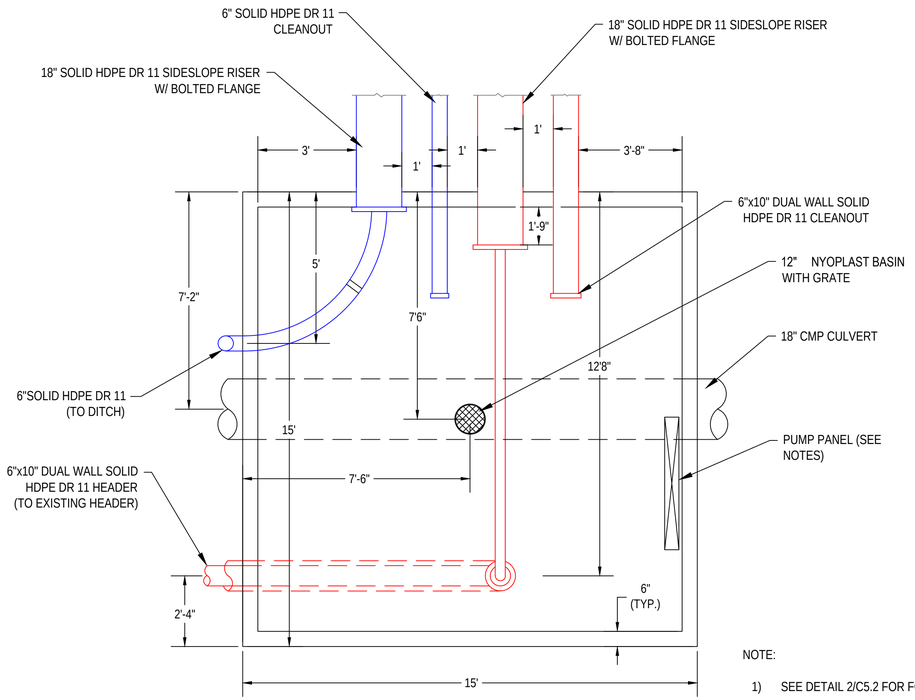
PROJ. NO. 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

CADD FILE: C5.0 DETAILS.DWG

DATE: 11/14/25

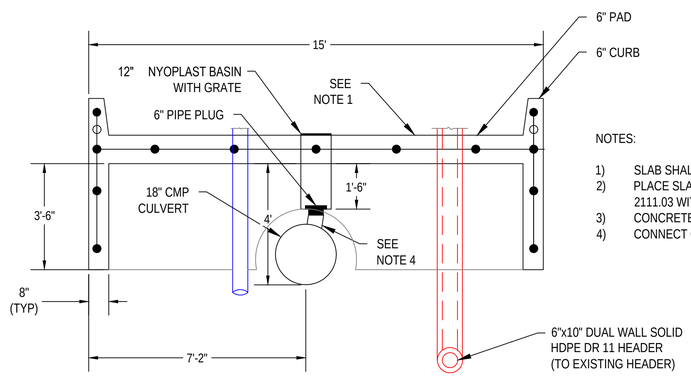
DRAWING NO. C5.1



NOTE:

1) SEE DETAIL 2/C5.2 FOR FOOTING REQUIREMENTS.

1 EAST BOUNDARY CONTAINMENT PAD PLAN VIEW
NOT TO SCALE



NOTES:

1) SLAB SHALL BE REINFORCED WITH #5'S AT 12" EW MID-DEPTH.
2) PLACE SLAB ON 6" OF IDOT GRANULAR SUB-BASE WITH COMPACTIVE EFFORT PER IDOT 2111.03 WITH A MAXIMUM 3 PASSES AT 150-200 LB/IN.
3) CONCRETE SHALL BE 3000 PSI AND AIR ENTRAINED.
4) CONNECT CONTAINMENT PAD DRAIN TO CULVERT USING 6" HDPE DR 11 PIPE.

2 EAST BOUNDARY CONTAINMENT PAD CROSS SECTION
NOT TO SCALE

GENERAL NOTES:

1) PUMP AND CONTROL PANEL SHALL BE PROVIDED AS DETAILED IN THE SPECIFICATIONS.
2) ALL METAL COMPONENTS SHALL BE STAINLESS STEEL.
3) LOW LEVEL SHUTOFF SHALL BE AT THE TOP OF THE PUMP OR AS RECOMMENDED BY PUMP MANUFACTURER. HIGH LEVEL SHUTOFF SHALL BE 3' ABOVE SUMP BOTTOM.
4) ON LEVEL SHALL BE AT 2' ABOVE SUMP BOTTOM. OFF LEVEL SHALL BE 6" ABOVE PUMP OR AS RECOMMENDED BY PUMP MANUFACTURER.
5) ALL CONTROL WIRING SHALL BE DIRECT FROM CONTROL PANEL WITH NO JUNCTION BOXES.
6) DISCHARGE LINE BETWEEN BOLTED FLANGES SHALL BE HEAVY DUTY AGRICULTURAL PUMP HOSE RATED AT 75 PSI MINIMUM WITH BANJO QUICK DISCONNECTS AT BOTH ENDS.
7) ALL ELECTRICAL WORK TO BE DESIGNED AND EXECUTED IN ACCORDANCE WITH NATIONAL, STATE, AND LOCAL ELECTRICAL CODES, INCLUDING NEC REQUIREMENTS, AND ANY OTHER AGENCY HAVING JURISDICTION OVER THE ELECTRICAL INSTALLATION.
8) ELECTRICAL SHOP DRAWINGS, CONDUIT LAYOUTS, VOLTAGE DROP, CONDUCTOR SIZING CALCULATIONS, ETC. SHALL BE PREPARED AND PROVIDED BY THE ELECTRICAL CONTRACTOR WITH O&M MANUALS.
9) BREAKOUT BOXES WITH AIRTIGHT SEALS AND POTTING SHALL BE USED BEFORE ELECTRIC/CONTROL PANELS. ALL CABLE BETWEEN SIDESLOPE RISER, BREAKOUT BOXES, AND PANEL SHALL BE IN PVC CONDUIT.
10) THREE GROUND RODS SHALL BE INSTALLED AT THE PANEL UNLESS FIELD TESTING SHOWS LESS GROUND RODS ARE NECESSARY.
11) WHERE POSSIBLE, CONDUIT SHALL BE CO-INSTALLED WITH THE PIPING.
12) PUMPS SHALL BE INSTALLED WITH HDPE DR 11 PIPING (STICKS, NOT COIL) FROM PUMP TO BOLTED FLANGE USING BANJO QUICK CONNECTS AT BOTH ENDS.

ISSUED FOR REVIEW

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SHEET TITLE
CONTAINMENT PAD DETAILS

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
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DWN. BY:	CTC	PROJ. MGR	CLC
CHK. BY:	TCB		
PROJ. NO.	27225435.00		
DSN. BY:	CTC		

CADD FILE:
C5.0 DETAILS.DWG

DATE:
11/14/25

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C5.2

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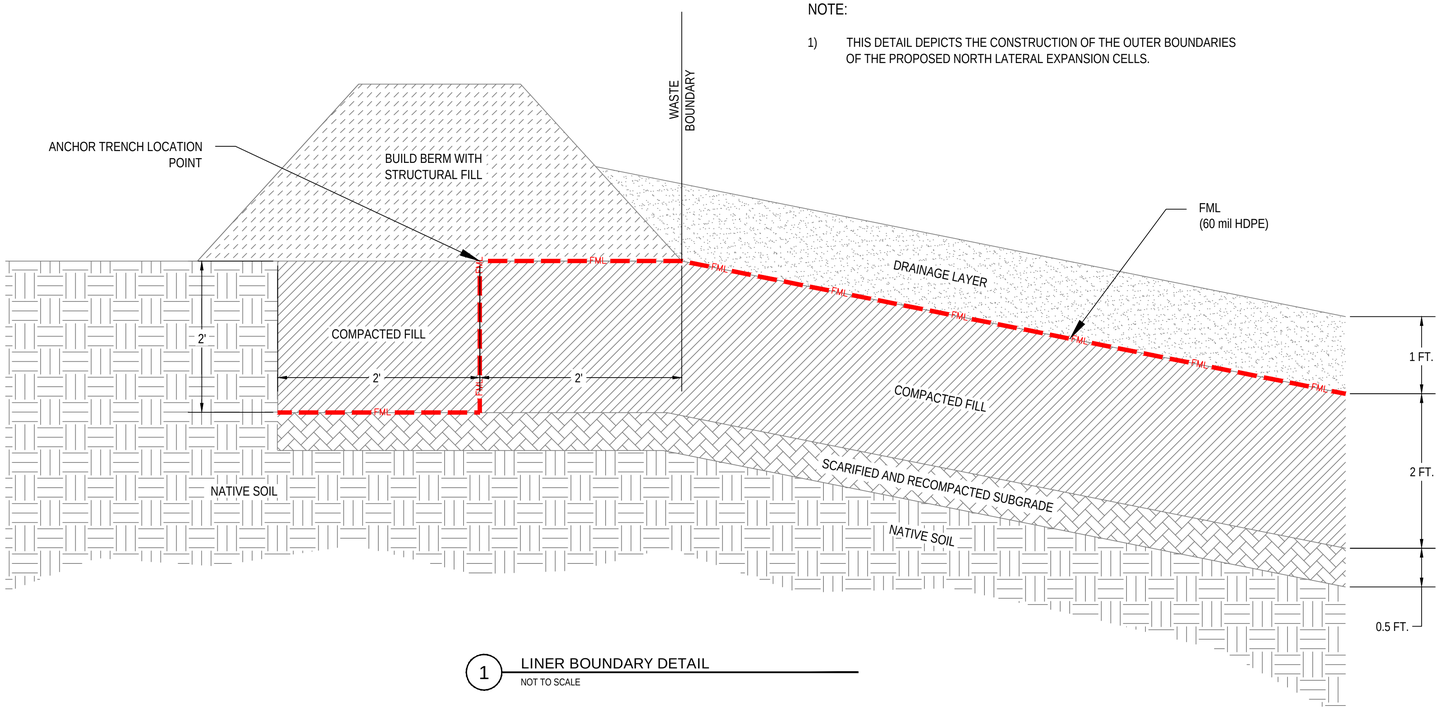
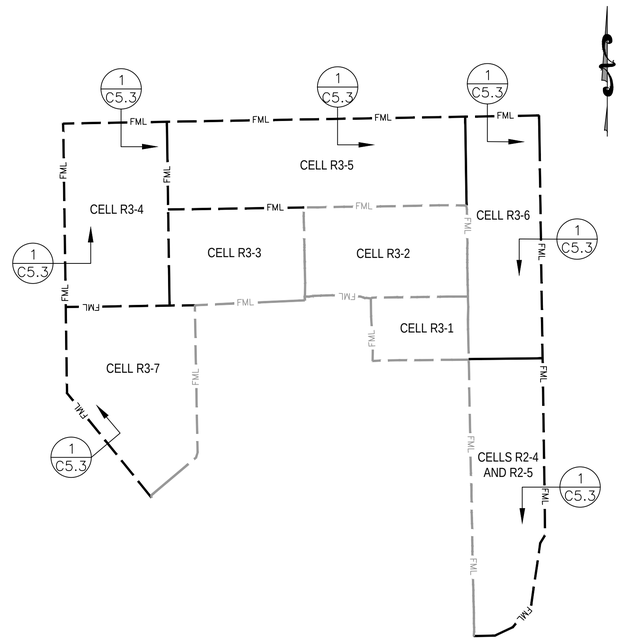


1 LINER BOUNDARY DETAIL
NOT TO SCALE

NOTE:

1) THIS DETAIL DEPICTS THE CONSTRUCTION OF THE OUTER BOUNDARIES OF THE PROPOSED NORTH LATERAL EXPANSION CELLS.



ISSUED FOR REVIEW

REV.	DATE	CK. BY

SHEET TITLE
PHASING DETAILS

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

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1690 ALL STATE COURT, SUITE 100
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PROJ. NO. 27225435.00
DSN. BY: CTC
DWN. BY: CTC
CHK. BY: TCB
PROJ. MGR: CLC

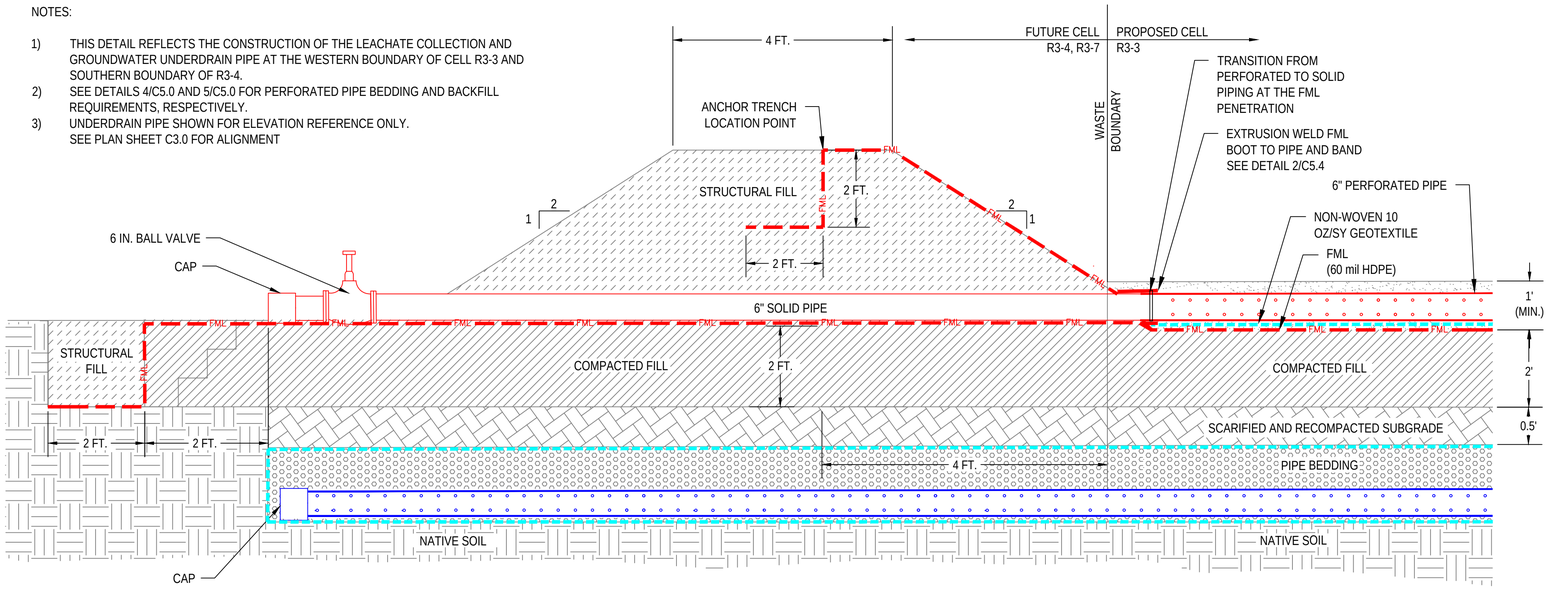
CADD FILE:
C5.0 DETAILS.DWG

DATE:
11/14/25

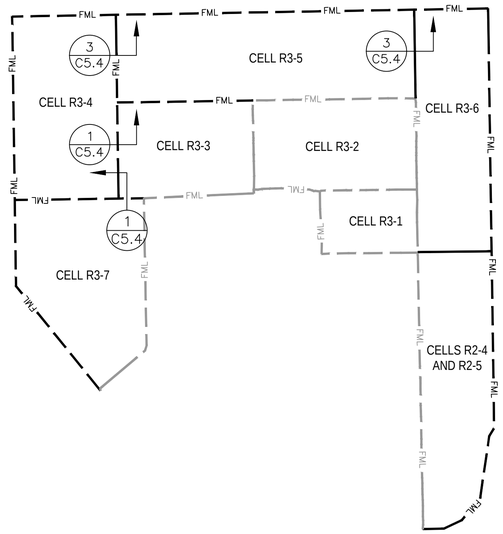
DRAWING NO.
C5.3

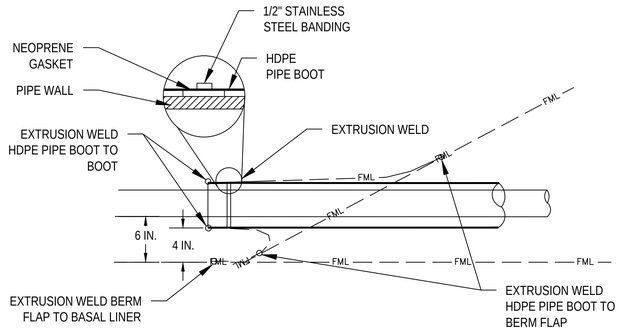
NOTES:

1) THIS DETAIL REFLECTS THE CONSTRUCTION OF THE LEACHATE COLLECTION AND GROUNDWATER UNDERDRAIN PIPE AT THE WESTERN BOUNDARY OF CELL R3-3 AND SOUTHERN BOUNDARY OF R3-4.
2) SEE DETAILS 4/C5.0 AND 5/C5.0 FOR PERFORATED PIPE BEDDING AND BACKFILL REQUIREMENTS, RESPECTIVELY.
3) UNDERDRAIN PIPE SHOWN FOR ELEVATION REFERENCE ONLY. SEE PLAN SHEET C3.0 FOR ALIGNMENT

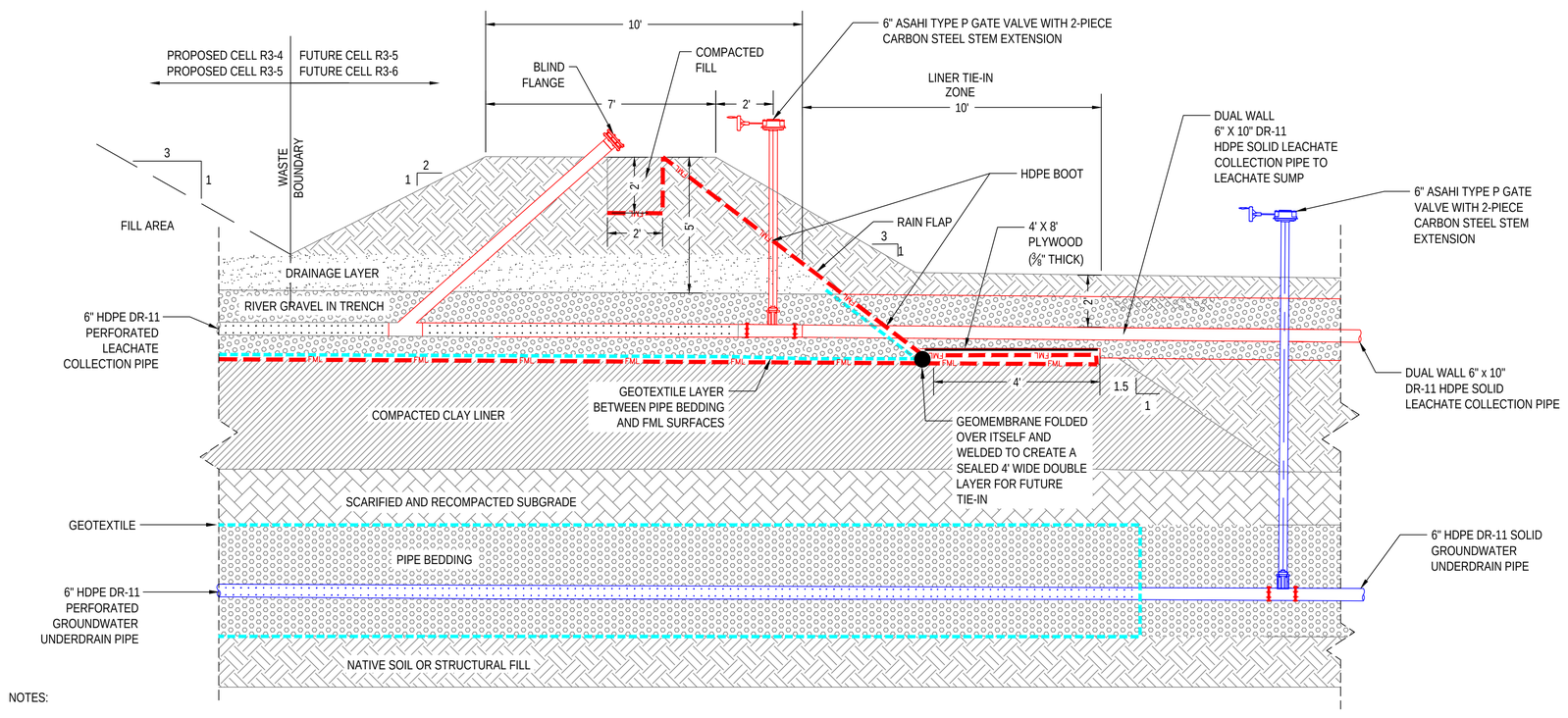


1 LINER CONSTRUCTION DETAIL, CELL R3-3 WEST BOUNDARY & CELL R3-4 SOUTH BOUNDARY
NOT TO SCALE





2 PIPE PENETRATION DETAIL
NOT TO SCALE



NOTES:

1) THIS DETAIL REFLECTS THE CONSTRUCTION OF THE LEACHATE COLLECTION PIPE AND GROUNDWATER UNDERDRAIN PIPE AT THE EASTERN BOUNDARY OF CELLS R3-4 AND R3-5.
2) SEE DETAILS 4/C5.0 AND 5/C5.0 FOR PERFORATED PIPE BEDDING AND BACKFILL REQUIREMENTS, RESPECTIVELY.
3) UNDERDRAIN PIPE SHOWN FOR ELEVATION REFERENCE ONLY. SEE PLAN SHEET C3.0 FOR ALIGNMENT

3 LINER CONSTRUCTION DETAIL, CELL R3-4 & CELL R3-5 EAST BOUNDARY
NOT TO SCALE

ISSUED FOR REVIEW

REV.	DATE	CK. BY

SHEET TITLE: PHASING DETAILS

PROJECT TITLE: GRRWA SANITARY LANDFILL FUTURE PHASE DESIGN MODIFICATIONS

CLIENT: GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

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PH. (515) 631-6160

PROJ. MGR	DSN. BY:	CHK. BY:	PROJ. NO.
CLC	CTC	TCB	27225435.00

DSN. BY: CTC

CADD FILE: C5.0 DETAILS.DWG

DATE: 11/14/25

DRAWING NO. C5.4

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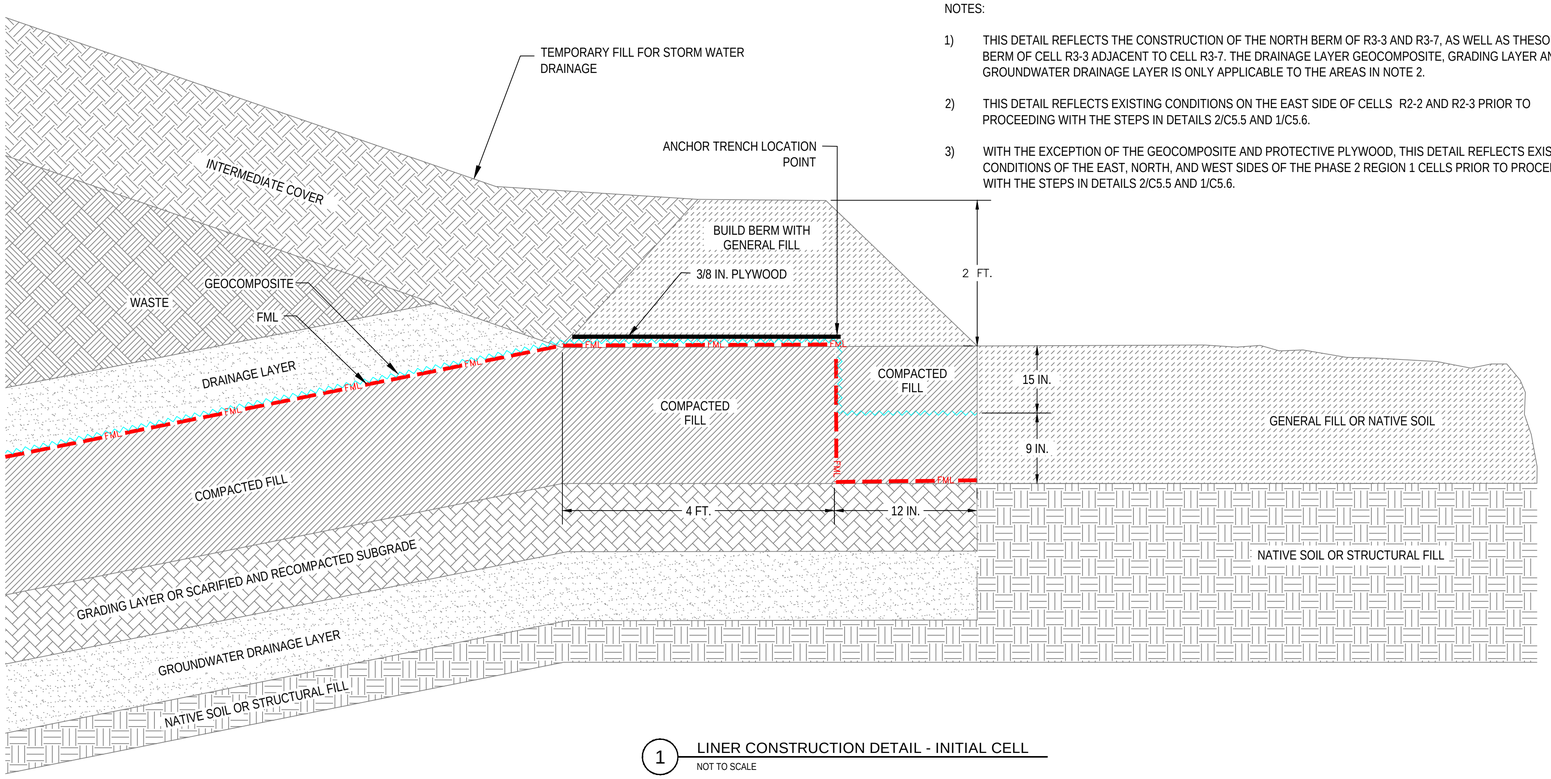
NOTES:

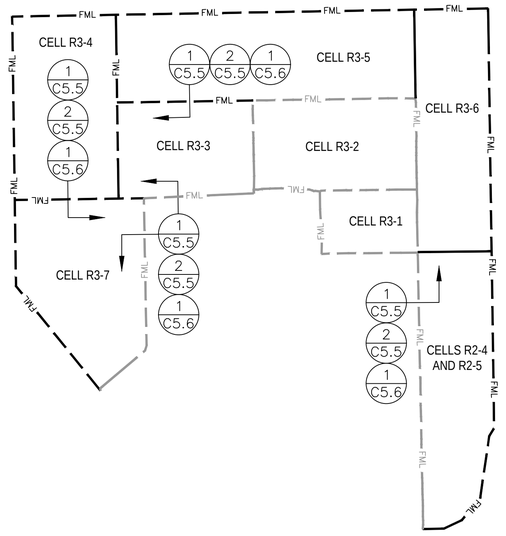
1) THIS DETAIL REFLECTS THE CONSTRUCTION OF THE NORTH BERM OF R3-3 AND R3-7, AS WELL AS THESOUTH BERM OF CELL R3-3 ADJACENT TO CELL R3-7. THE DRAINAGE LAYER GEOCOMPOSITE, GRADING LAYER AND GROUNDWATER DRAINAGE LAYER IS ONLY APPLICABLE TO THE AREAS IN NOTE 2.

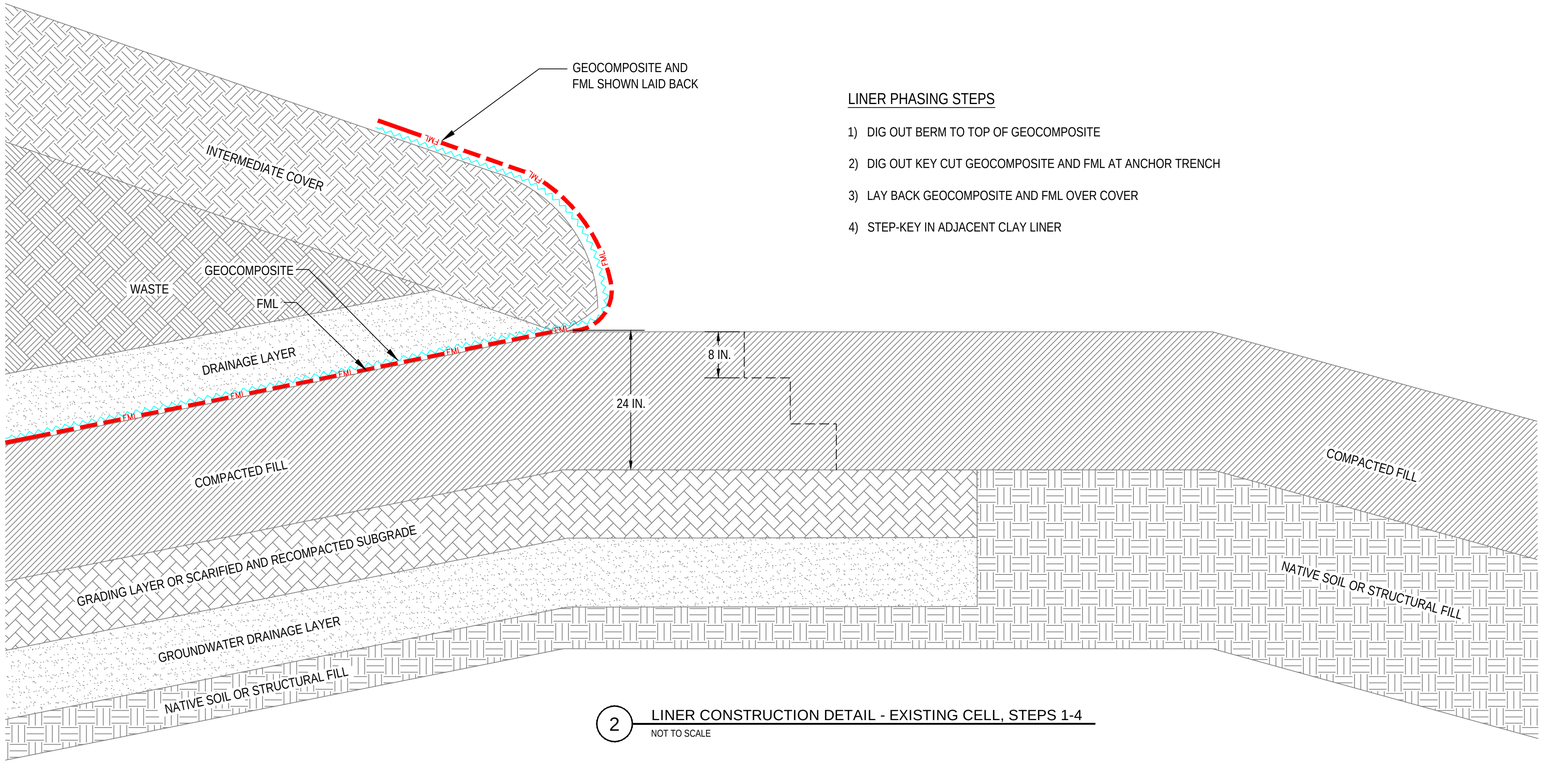
2) THIS DETAIL REFLECTS EXISTING CONDITIONS ON THE EAST SIDE OF CELLS R2-2 AND R2-3 PRIOR TO PROCEEDING WITH THE STEPS IN DETAILS 2/C5.5 AND 1/C5.6.

3) WITH THE EXCEPTION OF THE GEOCOMPOSITE AND PROTECTIVE PLYWOOD, THIS DETAIL REFLECTS EXISTING CONDITIONS OF THE EAST, NORTH, AND WEST SIDES OF THE PHASE 2 REGION 1 CELLS PRIOR TO PROCEEDING WITH THE STEPS IN DETAILS 2/C5.5 AND 1/C5.6.



1 LINER CONSTRUCTION DETAIL - INITIAL CELL
NOT TO SCALE





LINER PHASING STEPS

1) DIG OUT BERM TO TOP OF GEOCOMPOSITE
2) DIG OUT KEY CUT GEOCOMPOSITE AND FML AT ANCHOR TRENCH
3) LAY BACK GEOCOMPOSITE AND FML OVER COVER
4) STEP-KEY IN ADJACENT CLAY LINER

2 LINER CONSTRUCTION DETAIL - EXISTING CELL, STEPS 1-4
NOT TO SCALE

ISSUED FOR REVIEW

REV.	DATE	CK. BY

SHEET TITLE: PHASING DETAILS

PROJECT TITLE: GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT:
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH: (515) 631-6160

DWN. BY:	CTC	PROJ. MGR	CLC
CHK. BY:	TCB		
PROJ. NO. 27225435.00			
DSN. BY:	CTC		

CADD FILE: C5.0 DETAILS.DWG

DATE: 11/14/25

DRAWING NO. C5.5

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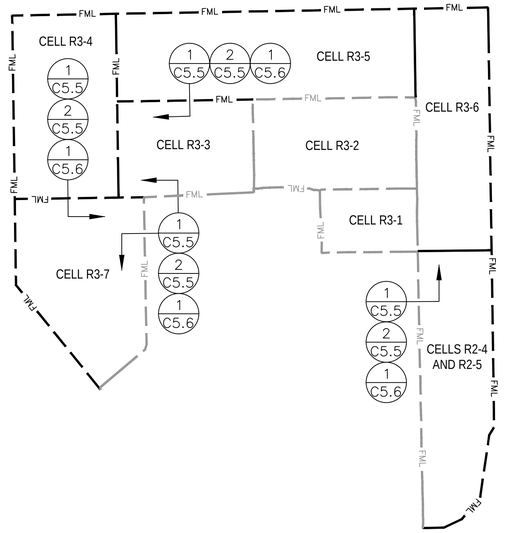
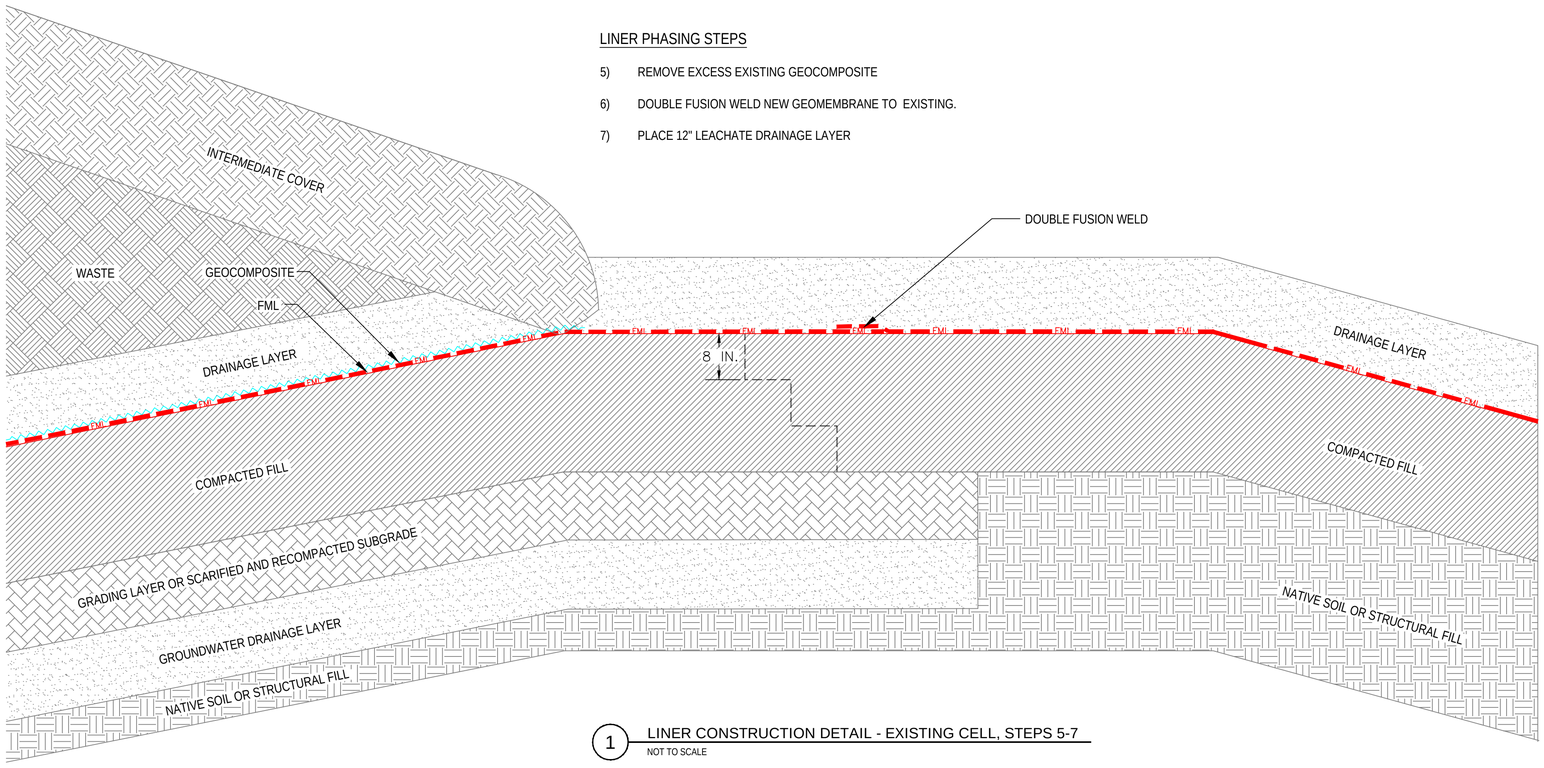


LINER PHASING STEPS

5) REMOVE EXCESS EXISTING GEOCOMPOSITE

6) DOUBLE FUSION WELD NEW GEOMEMBRANE TO EXISTING.

7) PLACE 12" LEACHATE DRAINAGE LAYER



1 LINER CONSTRUCTION DETAIL - EXISTING CELL, STEPS 5-7
NOT TO SCALE

ISSUED FOR REVIEW

REV.	DATE	CK. BY
	.	.
	.	.
	.	.
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SHEET TITLE
PHASING DETAILS

PROJECT TITLE
GRRWA SANITARY LANDFILL
FUTURE PHASE DESIGN MODIFICATIONS

CLIENT
GREAT RIVER REGIONAL
WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA 52627

SCS ENGINEERS
1690 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH. (515) 631-6160

PROJ. NO.	DSN. BY:	DWN. BY:	CHK. BY:	PROJ. MGR
27225435.00	CTC	CTC	TCB	CLC

CADD FILE:
C5.0 DETAILS.DWG

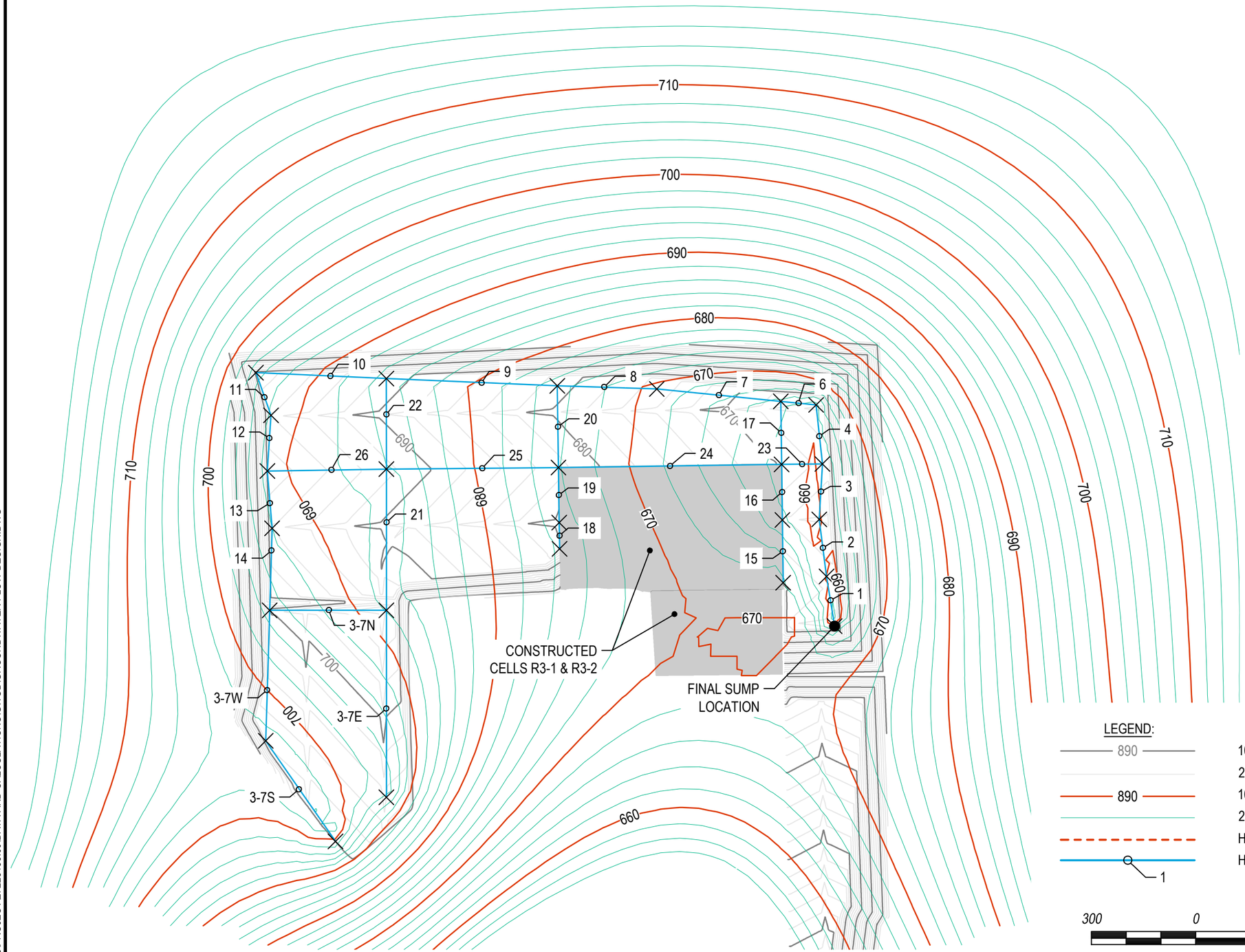
DATE:
11/14/25

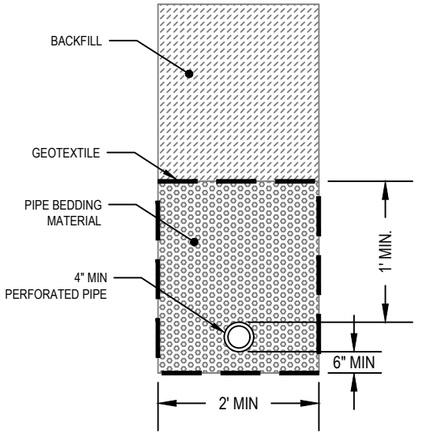
DRAWING NO.
C5.6

\\DES-FS01\DESMOINES\PROJECT\27225435.00\AUTOCAD\LAYOUTS\C5.0 DETAILS.DWG

Attachment 2

Final Groundwater Model Results





NOTES:

1. GEOTEXTILE AND PIPE BEDDING PERMEABILITY EQUAL TO OR GREATER THAN 5.0×10^{-1} CM / SEC

1 UNDERDRAIN PIPE TRENCH DETAIL
NOT TO SCALE

LEGEND:

- 890 — 10' CONTOUR, EXISTING OR PROPOSED CELL LINER
- 890 — 2' CONTOUR, EXISTING OR PROPOSED CELL LINER
- 890 — 10' CONTOUR, PROPOSED GROUNDWATER ELEVATION
- 890 — 2' CONTOUR, PROPOSED GROUNDWATER ELEVATION
- HEAD-SPECIFIED AQUIFER BOUNDARY CONDITION
- 1 — HEAD-SPECIFIED LINE SINK MODEL CONDITION

300 0 300 600
SCALE FEET

REV:	DATE	CK BY
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-

SHEET TITLE
FINAL GROUNDWATER MODEL RESULTS

PROJECT TITLE
GROUNDWATER MODELING REPORT

CLIENT
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON, IOWA

SCS ENGINEERS
1680 ALL STATE COURT, SUITE 100
WEST DES MOINES, IA 50265
PH: (515) 631-6160

PROJ. NO.	DSN. BY:	DWN. BY:	CHK. BY:	PROJ. MGR
27225270.00	CTC	CTC	TCB	CLC

CADD FILE: GROUNDWATER FLOW DESIGN.DWG

DATE: 11/17/25

DRAWING NO. **1**

\\DES-FS01\DESMOINES\PROJECT\27225435.00\DATA AND CALCULATIONS\GWUD\GROUNDWATER FLOW DESIGN.DWG

Attachment 3

Groundwater Underdrain System Calculations

Table 1 Slope and Flow Data

LineSink	Slope	Inflow ft^3/day	Inflow ft^3/day/ft
1	0.50%	5074.91	34.99
2	0.50%	2723.21	16.46
3	0.50%	1846.73	11.56
4	0.47%	2742.41	16.04
6	2.25%	1688.17	16.54
7	1.76%	2943.45	8.20
8	2.08%	1797.47	6.28
9	2.00%	2726.08	5.54
10	2.50%	1875.99	4.99
11	2.33%	843.70	6.48
12	0.21%	946.03	5.89
13	0.50%	914.64	5.53
14	1.47%	884.15	3.75
15	4.89%	N/A	N/A
16	0.48%	264.09	1.65
17	0.77%	9.23	0.05
18	2.08%	N/A	N/A
19	0.44%	178.60	1.13
20	0.31%	55.34	0.24
21	0.50%	N/A	N/A
22	0.60%	N/A	N/A
23	1.46%	67.73	0.58
24	2.02%	962.79	1.50
25	2.45%	995.37	2.01
26	1.30%	1096.02	3.20
3-7 N	2.00%	N/A	N/A
3-7 W	2.20%	61.02	0.16
3-7 S	0.50%	N/A	N/A
3-7 E	2.00%	N/A	N/A

Some of the line sinks in the model specified a higher elevation than the surrounding groundwater. These line sinks artificially added additional groundwater to the modeled water table that does not exist (raising the groundwater contours to match the line sink). These line sinks were excluded from analysis. However, this additional groundwater was not eliminated from the total flow, making the model more conservative.

Groundwater Underdrain System
Calculations

Maximum Flow Conveyed (Linesink 1) 30697.12 **ft^3/day**

Capacity of Proposed Interceptor Trench Piping

$$Q = \left(\frac{1.49}{n}\right) AR^{2/3}\sqrt{S}$$ Where:

Pipe Diameter	=	6	in
n	=	0.013	
A	=	0.196	ft^2
P	=	1.571	ft
R	=	0.125	ft
S	=	0.5%	
Q_{pipe}	=	**3.99E-01**	**ft^3/sec**
	=	**34,488.48**	**ft^3/day**
		179.16	**gpm**

Q_{pipe}/Q_{in}	=	1.12
Sufficient capacity in pipe?		Yes

Table 2 Pipe Sizing Table

				6" pipe		
LineSink	Inflow ft^3/day	Inflow ft^3/day/ft	Inflow from self and other pipes (Qin)	Q Pipe	Units	Q_{pipe}/Q_{in}
1	5074.91	34.99	30697.12	0.399172 34488.48	ft3/sec ft3/day	1.12
2	2723.21	16.46	25622.22	0.396136 34226.14	ft3/sec ft3/day	1.34
3	1846.73	11.56	22899.01	0.398054 34391.9	ft3/sec ft3/day	1.50
4	2742.41	16.04	13782.81	0.384853 33251.28	ft3/sec ft3/day	2.41
6	1688.17	16.54	11040.39	0.84453 72967.4	ft3/sec ft3/day	6.61
7	2943.45	8.20	9342.99	0.747281 64565.08	ft3/sec ft3/day	6.91
8	1797.47	6.28	6399.54	0.812249 70178.31	ft3/sec ft3/day	10.97
9	2726.08	5.54	4602.07	0.795661 68745.07	ft3/sec ft3/day	14.94
10	1875.99	4.99	1875.99	0.889576 76859.32	ft3/sec ft3/day	40.97
11	843.70	6.48	843.70	0.859404 74252.5	ft3/sec ft3/day	88.01
12	946.03	5.89	1789.73	0.255715 22093.77	ft3/sec ft3/day	12.34
13	914.64	5.53	1859.81	0.398858 34461.35	ft3/sec ft3/day	18.53
14	884.15	3.75	945.18	0.681258 58860.65	ft3/sec ft3/day	62.27
15	N/A	N/A	N/A	1.244073 107487.9	ft3/sec ft3/day	N/A
16	264.09	1.65	264.09	0.390319 33723.59	ft3/sec ft3/day	127.70
17	9.23	0.05	9.23	0.492473 42549.68	ft3/sec ft3/day	4608.19
18	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A
19	178.60	1.13	178.60	0.492473 42549.68	ft3/sec ft3/day	238.24
20	55.34	0.24	55.34	0.492473 42549.68	ft3/sec ft3/day	768.87
21	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A
22	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A
23	67.73	0.58	7269.47	0.492473 42549.68	ft3/sec ft3/day	5.85
24	962.79	1.50	6937.66	0.492473 42549.68	ft3/sec ft3/day	6.13
25	995.37	2.01	5740.93	0.492473 42549.68	ft3/sec ft3/day	7.41
26	1096.02	3.20	4745.56	0.492473 42549.68	ft3/sec ft3/day	8.97
3-7 N	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A
3-7 W	61.02	0.16	61.02	0.492473 42549.68	ft3/sec ft3/day	697.27
3-7 S	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A
3-7 E	N/A	N/A	N/A	0.492473 42549.68	ft3/sec ft3/day	N/A

Some of the line sinks in the model specified a higher elevation than the surrounding groundwater. These line sinks artificially added additional groundwater to the modeled water table that does not exist (raising the groundwater contours to match the line sink). These line sinks were excluded from analysis (Grayed out). However, this additional groundwater was not eliminated from the total flow, making the

Attachment 4

HELP Model Data

Table 1
Summary of HELP Model Inputs
Fort Madison, IA

Term		Description	Value	Units	Source
Layer 1	Thickness	Intermediate Cover	24	inches	
	Characteristics				HELP model default for silty clay soils (HELP No. 12)
Layer 2	Thickness	Waste	198	inches	Approximate average waste thickness for the landfill
	Characteristics				HELP model default for municipal waste (HELP No. 18)
Layer 3	Thickness	Drainage Layer	12	inches	
	Hydraulic Conductivity		2.0E-02	cm/sec	Based on design
	Slope, Upper		34.0	%	Based on design
	Drainage Length		100	feet	Based on design (maximum distance along flow path)
	Slope, Lower		2.86	%	Based on design
	Drainage Length		170.0	feet	Based on design (maximum distance along flow path)
	Slope, Bottom of Cell		3.08	%	Based on design
	Drainage Length		315	feet	Based on design (maximum distance along flow path)
Layer 4	Thickness	GCL	0.24	inches	Based on design
	Hydraulic Conductivity		3.0E-09	cm/sec	HELP model default for barrier soils (HELP No. 17)
Layer 5	Thickness	Compacted fill	24.00	inches	Based on design
	Hydraulic Conductivity		1.0 E-7	cm/sec	HELP model default for barrier soils (HELP No. 16)
Curve Number for Runoff			95.22		Based on 2019 Help Model
Precipitation			Synthetically generated (See Note 1)		
Temperature			Synthetically generated (See Note 1)		
Solar Radiation			Synthetically generated (See Note 1)		
Windspeed			Synthetically generated (See Note 2)		
Relative Humidity			Synthetically generated (See Note 2)		
Growing Season	Start	112	Based on 2019 Help Model		
	End	291			
Leaf Area Index		0	Based on 2019 Help Model		
Evaporative Zone			24	inches	Based on 2019 Help Model

Notes:

1. Precipitation and temperature data were synthetically generated using the HELP WGEN Simulator for ZIP code 52627
2. Imported from NREL's NSRDB provided in the_hydrologic_evaluation_of_landfill_performance_help_4.0_manual_v2

Upper Slope

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Great River Regional **Simulated On:** 11/17/2025 13:21

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SiCL - Silty Clay Loam
Material Texture Number 12

Thickness	=	24	inches
Porosity	=	0.471	vol/vol
Field Capacity	=	0.342	vol/vol
Wilting Point	=	0.21	vol/vol
Initial Soil Water Content	=	0.3388	vol/vol
Effective Sat. Hyd. Conductivity	=	4.20E-05	cm/sec

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	1164	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Coarse Sand
Material Texture Number 43

Thickness	=	12	inches
Porosity	=	0.417	vol/vol
Field Capacity	=	0.045	vol/vol
Wilting Point	=	0.018	vol/vol
Initial Soil Water Content	=	0.045	vol/vol
Effective Sat. Hyd. Conductivity	=	2.00E-02	cm/sec
Slope	=	34	%
Drainage Length	=	100	ft

Layer 4

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.6	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 5

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	95.2	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	24	inches
Initial Water in Evaporative Zone	=	8.132	inches
Upper Limit of Evaporative Storage	=	11.304	inches
Lower Limit of Evaporative Storage	=	5.04	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	358.808	inches
Total Initial Water	=	358.808	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	40.67	Degrees
Maximum Leaf Area Index	=	0	
Start of Growing Season (Julian Date)	=	112	days
End of Growing Season (Julian Date)	=	291	days
Average Wind Speed	=	8	mph
Average 1st Quarter Relative Humidity	=	74	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	73	%
Average 4th Quarter Relative Humidity	=	69	%

Note: Evapotranspiration data was obtained for Fort Madison, Iowa

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
1.008302	1.513704	2.230803	3.05813	4.440576	4.295041
3.795282	3.372909	3.243647	2.686549	2.693697	1.825214

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
32.8	34.7	43.4	55.3	68.3	80.4
83.7	81.4	72	59.3	46.2	36.4

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Average Annual Totals Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:26

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	34.16	[4.57]	124,014.8	100.00
Runoff	8.006	[2.108]	29,063.0	23.44
Evapotranspiration	25.478	[2.664]	92,484.4	74.58
Subprofile1				
Lateral drainage collected from Layer 3	0.6838	[0.6901]	2,482.1	2.00
Percolation/leakage through Layer 5	0.000008	[0.000007]	0.0299	0.00
Average Head on Top of Layer 4	0.0054	[0.0055]	---	---
Water storage				
Change in water storage	-0.0041	[1.042]	-14.7	-0.01

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:27

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.96		17,994.1
Runoff	4.096		14,870.1
Subprofile1			
Drainage collected from Layer 3	0.1298		471.2
Percolation/leakage through Layer 5	0.000001		0.0040
Average head on Layer 4	0.3757		---
Maximum head on Layer 4	0.7441		---
Location of maximum head in Layer 3	0.00	(feet from drain)	
Other Parameters			
Snow water	3.8218		13,873.1
Maximum vegetation soil water	0.4083	(vol/vol)	
Minimum vegetation soil water	0.2603	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Great River Regional
Simulated on: 11/17/2025 13:27
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	7.7266	0.3219
2	339.8879	0.2920
3	0.5400	0.0450
4	0.0000	0.0000
5	10.2480	0.4270
Snow water	0.0000	---

Low Slope

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Great River Regional **Simulated On:** 11/17/2025 13:37

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SiCL - Silty Clay Loam
Material Texture Number 12

Thickness	=	24	inches
Porosity	=	0.471	vol/vol
Field Capacity	=	0.342	vol/vol
Wilting Point	=	0.21	vol/vol
Initial Soil Water Content	=	0.3388	vol/vol
Effective Sat. Hyd. Conductivity	=	4.20E-05	cm/sec

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	1164	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Coarse Sand
Material Texture Number 43

Thickness	=	12	inches
Porosity	=	0.417	vol/vol
Field Capacity	=	0.045	vol/vol
Wilting Point	=	0.018	vol/vol
Initial Soil Water Content	=	0.0481	vol/vol
Effective Sat. Hyd. Conductivity	=	2.00E-02	cm/sec
Slope	=	2.86	%
Drainage Length	=	170	ft

Subsurface Inflow		0.68	inches/year

Layer 4

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.6	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 5

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	95.2	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	24	inches
Initial Water in Evaporative Zone	=	8.132	inches
Upper Limit of Evaporative Storage	=	11.304	inches
Lower Limit of Evaporative Storage	=	5.04	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	358.845	inches
Total Initial Water	=	358.845	inches
Total Subsurface Inflow	=	0.68	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	40.67	Degrees
Maximum Leaf Area Index	=	0	
Start of Growing Season (Julian Date)	=	112	days
End of Growing Season (Julian Date)	=	291	days
Average Wind Speed	=	8	mph
Average 1st Quarter Relative Humidity	=	74	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	73	%
Average 4th Quarter Relative Humidity	=	69	%

Note: Evapotranspiration data was obtained for Fort Madison, Iowa

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
1.008302	1.513704	2.230803	3.05813	4.440576	4.295041
3.795282	3.372909	3.243647	2.686549	2.693697	1.825214

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
32.8	34.7	43.4	55.3	68.3	80.4
83.7	81.4	72	59.3	46.2	36.4

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Average Annual Totals Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:43

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	34.16	[4.57]	124,014.8	100.00
Runoff	8.006	[2.108]	29,063.0	23.44
Evapotranspiration	25.478	[2.664]	92,484.4	74.58
Subprofile1				
Subsurface Inflow into Layer 3	0.6800	---	2,468.4	1.99
Lateral drainage collected from Layer 3	1.3640	[0.6822]	4,951.4	3.99
Percolation/leakage through Layer 5	0.000215	[0.000091]	0.7817	0.00
Average Head on Top of Layer 4	0.1959	[0.0979]	---	---
Water storage				
Change in water storage	-0.0041	[1.1717]	-14.7	-0.01

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:43

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.96		17,994.1
Runoff	4.096		14,870.1
Subprofile1			
Drainage collected from Layer 3	0.0705		255.8
Percolation/leakage through Layer 5	0.000009		0.0316
Average head on Layer 4	3.6975		---
Maximum head on Layer 4	6.0039		---
Location of maximum head in Layer 3	31.87	(feet from drain)	
Other Parameters			
Snow water	3.8218		13,873.1
Maximum vegetation soil water	0.4083	(vol/vol)	
Minimum vegetation soil water	0.2603	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Great River Regional
Simulated on: 11/17/2025 13:43
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	7.7266	0.3219
2	339.8879	0.2920
3	0.5773	0.0481
4	0.0000	0.0000
5	10.2480	0.4270
Snow water	0.0000	---

Bottom of Cell

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Great River Regional **Simulated On:** 11/17/2025 14:05

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SiCL - Silty Clay Loam
Material Texture Number 12

Thickness	=	24	inches
Porosity	=	0.471	vol/vol
Field Capacity	=	0.342	vol/vol
Wilting Point	=	0.21	vol/vol
Initial Soil Water Content	=	0.3388	vol/vol
Effective Sat. Hyd. Conductivity	=	4.20E-05	cm/sec

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	1164	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Coarse Sand
Material Texture Number 43

Thickness	=	12	inches
Porosity	=	0.417	vol/vol
Field Capacity	=	0.045	vol/vol
Wilting Point	=	0.018	vol/vol
Initial Soil Water Content	=	0.0451	vol/vol
Effective Sat. Hyd. Conductivity	=	2.00E-02	cm/sec
Slope	=	3.08	%
Drainage Length	=	315	ft

Layer 4

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.6	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 5

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	95.2	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	24	inches
Initial Water in Evaporative Zone	=	8.132	inches
Upper Limit of Evaporative Storage	=	11.304	inches
Lower Limit of Evaporative Storage	=	5.04	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	358.809	inches
Total Initial Water	=	358.809	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	40.67	Degrees
Maximum Leaf Area Index	=	0	
Start of Growing Season (Julian Date)	=	112	days
End of Growing Season (Julian Date)	=	291	days
Average Wind Speed	=	8	mph
Average 1st Quarter Relative Humidity	=	74	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	73	%
Average 4th Quarter Relative Humidity	=	69	%

Note: Evapotranspiration data was obtained for Fort Madison, Iowa

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
1.008302	1.513704	2.230803	3.05813	4.440576	4.295041
3.795282	3.372909	3.243647	2.686549	2.693697	1.825214

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
32.8	34.7	43.4	55.3	68.3	80.4
83.7	81.4	72	59.3	46.2	36.4

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Average Annual Totals Summary

Title: Great River Regional
Simulated on: 11/17/2025 14:11

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	34.16	[4.57]	124,014.8	100.00
Runoff	8.006	[2.108]	29,063.0	23.44
Evapotranspiration	25.478	[2.664]	92,484.4	74.58
Subprofile1				
Lateral drainage collected from Layer 3	0.6836	[0.7005]	2,481.4	2.00
Percolation/leakage through Layer 5	0.000172	[0.000163]	0.6242	0.00
Average Head on Top of Layer 4	0.1689	[0.1731]	---	---
Water storage				
Change in water storage	-0.0040	[1.2319]	-14.6	-0.01

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Great River Regional
Simulated on: 11/17/2025 14:11

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.96		17,994.1
Runoff	4.096		14,870.1
Subprofile1			
Drainage collected from Layer 3	0.0538		195.2
Percolation/leakage through Layer 5	0.000011		0.0406
Average head on Layer 4	4.8547		---
Maximum head on Layer 4	8.2621		---
Location of maximum head in Layer 3	46.70	(feet from drain)	
Other Parameters			
Snow water	3.8218		13,873.1
Maximum vegetation soil water	0.4083	(vol/vol)	
Minimum vegetation soil water	0.2603	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Great River Regional
Simulated on: 11/17/2025 14:11
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	7.7266	0.3219
2	339.8879	0.2920
3	0.5429	0.0452
4	0.0000	0.0000
5	10.2480	0.4270
Snow water	0.0000	---

Low Slope With Recirculation

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Great River Regional **Simulated On:** 11/17/2025 13:50

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SiCL - Silty Clay Loam
Material Texture Number 12

Thickness	=	24	inches
Porosity	=	0.471	vol/vol
Field Capacity	=	0.342	vol/vol
Wilting Point	=	0.21	vol/vol
Initial Soil Water Content	=	0.3516	vol/vol
Effective Sat. Hyd. Conductivity	=	4.20E-05	cm/sec

Note: 90% of drainage collected from Layer 3 is recirculated into this layer.

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	1164	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Coarse Sand
Material Texture Number 43

Thickness	=	12	inches
Porosity	=	0.417	vol/vol
Field Capacity	=	0.045	vol/vol
Wilting Point	=	0.018	vol/vol
Initial Soil Water Content	=	0.048	vol/vol
Effective Sat. Hyd. Conductivity	=	2.00E-02	cm/sec
Slope	=	2.86	%

Drainage Length	=	170	ft
Subsurface Inflow		0.68	inches/year

Note: 90% of drainage collected from this layer is recirculated into Layer 1.

Layer 4

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.6	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 5

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	95.2	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	24	inches
Initial Water in Evaporative Zone	=	8.439	inches
Upper Limit of Evaporative Storage	=	11.304	inches
Lower Limit of Evaporative Storage	=	5.04	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	359.151	inches
Total Initial Water	=	359.151	inches
Total Subsurface Inflow	=	0.68	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	40.67	Degrees
Maximum Leaf Area Index	=	0	
Start of Growing Season (Julian Date)	=	112	days
End of Growing Season (Julian Date)	=	291	days
Average Wind Speed	=	8	mph
Average 1st Quarter Relative Humidity	=	74	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	73	%
Average 4th Quarter Relative Humidity	=	69	%

Note: Evapotranspiration data was obtained for Fort Madison, Iowa

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
1.008302	1.513704	2.230803	3.05813	4.440576	4.295041
3.795282	3.372909	3.243647	2.686549	2.693697	1.825214

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
32.8	34.7	43.4	55.3	68.3	80.4
83.7	81.4	72	59.3	46.2	36.4

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Average Annual Totals Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:56

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	34.16	[4.57]	124,014.8	100.00
Runoff	9.478	[2.31]	34,406.3	27.74
Evapotranspiration	24.250	[2.526]	88,026.0	70.98
Subprofile1				
Recirculation into Layer 1	9.9620	[3.4132]	36,162.0	29.16
Subsurface Inflow into Layer 3	0.6800	---	2,468.4	1.99
Lateral drainage collected from Layer 3	1.1069	[0.3792]	4,018.0	3.24
Drainage recirculated from Layer 3	9.9620	[3.4132]	36,162.0	29.16
Percolation/leakage through Layer 5	0.001465	[0.000459]	5.3188	0.00
Average Head on Top of Layer 4	1.5899	[0.5445]	---	---
Water storage				
Change in water storage	0.0079	[1.1961]	28.6	0.02

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Great River Regional
Simulated on: 11/17/2025 13:57

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.96		17,994.1
Runoff	4.226		15,341.2
Subprofile1			
Drainage Recirculated into Layer 1	0.0782		283.7
Drainage collected from Layer 3	0.0087		31.5
Drainage recirculated from Layer 3	0.0782		283.7
Percolation/leakage through Layer 5	0.000011		0.0383
Average head on Layer 4	4.5566		---
Maximum head on Layer 4	7.2004		---
Location of maximum head in Layer 3	35.57	(feet from drain)	
Other Parameters			
Snow water	3.8218		13,873.1
Maximum vegetation soil water	0.4495	(vol/vol)	
Minimum vegetation soil water	0.2932	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

Title: Great River Regional
Simulated on: 11/17/2025 13:57
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	8.8109	0.3671
2	339.8879	0.2920
3	0.9908	0.0826
4	0.0000	0.0000
5	10.2480	0.4270
Snow water	0.0000	---

Bottom of Cell with Recirculation

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
HELP MODEL VERSION 4.0 BETA (2018)
DEVELOPED BY USEPA NATIONAL RISK MANAGEMENT RESEARCH LABORATORY

Title: Great River Regional **Simulated On:** 11/17/2025 14:19

Layer 1

Type 1 - Vertical Percolation Layer (Cover Soil)
SiCL - Silty Clay Loam
Material Texture Number 12

Thickness	=	24	inches
Porosity	=	0.471	vol/vol
Field Capacity	=	0.342	vol/vol
Wilting Point	=	0.21	vol/vol
Initial Soil Water Content	=	0.3403	vol/vol
Effective Sat. Hyd. Conductivity	=	4.20E-05	cm/sec

Note: 90% of drainage collected from Layer 3 is recirculated into this layer.

Layer 2

Type 1 - Vertical Percolation Layer (Waste)
Municipal Solid Waste (MSW) (900 pcy)
Material Texture Number 18

Thickness	=	1164	inches
Porosity	=	0.671	vol/vol
Field Capacity	=	0.292	vol/vol
Wilting Point	=	0.077	vol/vol
Initial Soil Water Content	=	0.292	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-03	cm/sec

Layer 3

Type 2 - Lateral Drainage Layer
Coarse Sand
Material Texture Number 43

Thickness	=	12	inches
Porosity	=	0.417	vol/vol
Field Capacity	=	0.045	vol/vol
Wilting Point	=	0.018	vol/vol
Initial Soil Water Content	=	0.045	vol/vol
Effective Sat. Hyd. Conductivity	=	2.00E-02	cm/sec
Slope	=	3.08	%

Drainage Length	=	315	ft

Note: 90% of drainage collected from this layer is recirculated into Layer 1.

Layer 4

Type 4 - Flexible Membrane Liner

HDPE Membrane

Material Texture Number 35

Thickness	=	0.6	inches
Effective Sat. Hyd. Conductivity	=	2.00E-13	cm/sec
FML Pinhole Density	=	1	Holes/Acre
FML Installation Defects	=	4	Holes/Acre
FML Placement Quality	=	3	Good

Layer 5

Type 3 - Barrier Soil Liner

Liner Soil (High)

Material Texture Number 16

Thickness	=	24	inches
Porosity	=	0.427	vol/vol
Field Capacity	=	0.418	vol/vol
Wilting Point	=	0.367	vol/vol
Initial Soil Water Content	=	0.427	vol/vol
Effective Sat. Hyd. Conductivity	=	1.00E-07	cm/sec

Note: Initial moisture content of the layers and snow water were computed as nearly steady-state values by HELP.

General Design and Evaporative Zone Data

SCS Runoff Curve Number	=	95.2	
Fraction of Area Allowing Runoff	=	100	%
Area projected on a horizontal plane	=	1	acres
Evaporative Zone Depth	=	24	inches
Initial Water in Evaporative Zone	=	8.167	inches
Upper Limit of Evaporative Storage	=	11.304	inches
Lower Limit of Evaporative Storage	=	5.04	inches
Initial Snow Water	=	0	inches
Initial Water in Layer Materials	=	358.843	inches
Total Initial Water	=	358.843	inches
Total Subsurface Inflow	=	0	inches/year

Note: SCS Runoff Curve Number was User-Specified.

Evapotranspiration and Weather Data

Station Latitude	=	40.67	Degrees
Maximum Leaf Area Index	=	0	
Start of Growing Season (Julian Date)	=	112	days
End of Growing Season (Julian Date)	=	291	days
Average Wind Speed	=	8	mph
Average 1st Quarter Relative Humidity	=	74	%
Average 2nd Quarter Relative Humidity	=	75	%
Average 3rd Quarter Relative Humidity	=	73	%
Average 4th Quarter Relative Humidity	=	69	%

Note: Evapotranspiration data was obtained for Fort Madison, Iowa

Normal Mean Monthly Precipitation (inches)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
1.008302	1.513704	2.230803	3.05813	4.440576	4.295041
3.795282	3.372909	3.243647	2.686549	2.693697	1.825214

Note: Precipitation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Normal Mean Monthly Temperature (Degrees Fahrenheit)

Jan/Jul	Feb/Aug	Mar/Sep	Apr/Oct	May/Nov	Jun/Dec
32.8	34.7	43.4	55.3	68.3	80.4
83.7	81.4	72	59.3	46.2	36.4

Note: Temperature was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35
Solar radiation was simulated based on HELP V4 weather simulation for:
Lat/Long: 40.67/-91.35

Average Annual Totals Summary

Title: Great River Regional
Simulated on: 11/17/2025 14:24

	Average Annual Totals for Years 1 - 100*			
	(inches)	[std dev]	(cubic feet)	(percent)
Precipitation	34.16	[4.57]	124,014.8	100.00
Runoff	8.925	[2.246]	32,399.3	26.13
Evapotranspiration	24.731	[2.579]	89,774.7	72.39
Subprofile1				
Recirculation into Layer 1	4.5137	[3.1393]	16,384.9	13.21
Lateral drainage collected from Layer 3	0.5015	[0.3488]	1,820.5	1.47
Drainage recirculated from Layer 3	4.5137	[3.1393]	16,384.9	13.21
Percolation/leakage through Layer 5	0.001145	[0.000735]	4.1549	0.00
Average Head on Top of Layer 4	1.2396	[0.8619]	---	---
Water storage				
Change in water storage	0.0044	[1.1954]	16.0	0.01

* Note: Average inches are converted to volume based on the user-specified area.

Peak Values Summary

Title: Great River Regional
Simulated on: 11/17/2025 14:25

	Peak Values for Years 1 - 100*		
	(inches)		(cubic feet)
Precipitation	4.96		17,994.1
Runoff	4.153		15,076.0
Subprofile1			
Drainage Recirculated into Layer 1	0.0587		213.2
Drainage collected from Layer 3	0.0065		23.7
Drainage recirculated from Layer 3	0.0587		213.2
Percolation/leakage through Layer 5	0.000013		0.0485
Average head on Layer 4	5.8924		---
Maximum head on Layer 4	9.8243		---
Location of maximum head in Layer 3	52.15	(feet from drain)	
Other Parameters			
Snow water	3.8218		13,873.1
Maximum vegetation soil water	0.4318	(vol/vol)	
Minimum vegetation soil water	0.2755	(vol/vol)	

Final Water Storage in Landfill Profile at End of Simulation Period

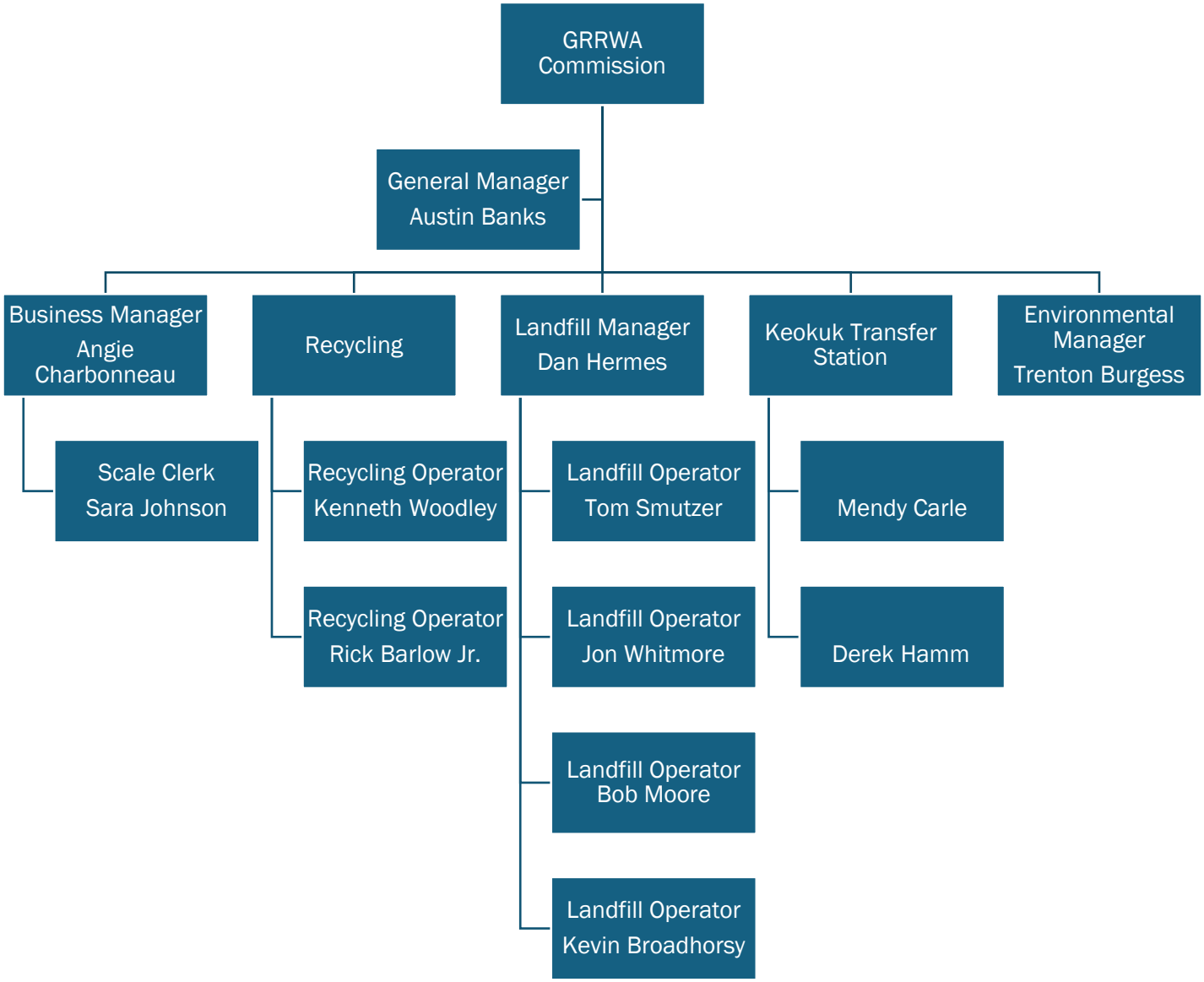
Title: Great River Regional
Simulated on: 11/17/2025 14:25
Simulation period: 100 years

	Final Water Storage	
Layer	(inches)	(vol/vol)
1	8.4978	0.3541
2	339.8879	0.2920
3	0.6493	0.0541
4	0.0000	0.0000
5	10.2480	0.4270
Snow water	0.0000	---

Appendix D

Organizational Chart and Operator Certification

Organizational Chart for Great River Regional Waste Authority



Notes:
The organizational chart is subject to change without prior notification to the DNR.

Proof of MSWLF Operator Certification

The certified operators utilized at the Great River Regional Waste Authority Sanitary Landfill as of the date of this permit renewal application:

Operator	Certification Number
Austin Banks	#31164
Dan Hermes	#30754
Tom Smutzer	#30703
Kenneth Woodley	#30755
Jon Whitmore	#30699
Rick Barlow Jr.	#30873
Trenton Burgess	#31066

Appendix E

Proof of Financial Assurance

June 12, 2025

AUSTIN BANKS
GENERAL MANAGER
GREAT RIVER REGIONAL WASTE AUTHORITY
2092 303RD AVENUE
FORT MADISON IA 52627

Re: Great River Regional Waste Authority Sanitary Landfill
Permit Number 56-SDP-07-80P
Approval of Financial Assurance

Dear Mr. Banks:

This is notification by the Iowa Department of Natural Resources (DNR) that the Great River Regional Waste Authority (Authority) has adequately complied with the financial assurance requirements of 567 IAC 113.14(455B) for the Great River Regional Waste Authority Sanitary Landfill. The Authority's financial assurance documentation (Doc #113135), received May 28, 2025, has been placed in the DNR's record files.

The projected deposit of **$27,472** to the Authority's closure and post-closure Local Government Dedicated Fund (LGDF) needs to be made by July 30, 2025. The deposit amounts are as stated in the "Formula for Projected Deposits" component of Section 7 of the Authority's Financial Assurance Report Form.

Please note that the Authority may withdraw money from the closure and post-closure LGDF without DNR approval for the purpose of funding closure, including partial closure, or post-closure activities in accordance with 567 IAC 113.14(8)"d." As a reminder, compliance with 567 IAC 113.14(455B) is to be submitted annually, by April 1st, confirming that all applicable financial assurance documents are updated as required.

Please feel free to contact me with any questions. I can be reached at (515) 802-8835 or mary.klemesrud@dnr.iowa.gov..

Sincerely,

Mary Klemesrud
Program Planner
Land Quality Bureau

Cc: Iowa DNR Field Office #6, Washington