ATTACHMENT 10

CLOSURE/POST-CLOSURE PLAN

May 2016

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ATTACHMENT 10

OTTAWA COUNTY FARMS LANDFILL
CONSTRUCTION PERMIT APPLICATION

COOPERSVILLE, MI

TABLE OF CONTENTS

FIGURES

10 CLOSURE AND POST CLOSURE PLAN

10.1 CLOSURE PLAN

The section documents the requirements of the final cover systems for closure of the landfill to satisfy the Closure Plans requirement of Rule 446.

10.1.1 General

Each cell or phase of the landfill will be closed in accordance with Rule 425 of Part 115, P.A. 451 in a manner that minimizes infiltration, erosion, maintenance, and the threat to human health.

The total landfill area will be approximately 242.32 acres, including the east expansion area which is approximately 51.3 acres. Approximately 35.7 acres have final cover in place, however, a portion of this final cover will be overlapped by the vertical expansion. Approximately 22.9 million cubic yards of the 26.74 million permitted cubic yards of airspace have been filled as of March 30, 2016. The lateral and vertical expansion will add 31.84 million cubic yards resulting in a total airspace of 57 million cubic yards. The remaining airspace will provide an estimated 61 year of life based at the current waste generation rate of approximately 600,000 cubic yards per year.

Final cover will be installed as soon as practicable as portions of the landfill reach final waste elevations. This will limit the amount of storm water infiltrating into the waste and leachate collection system. The installation of final cover will proceed in general from an east to west direction.

Surface water will be controlled with diversion berms formed within the cover system. Stormwater will be discharged to the sedimentation ponds via downlets and perimeter ditches.

10.1.2 Cover Description

Final cover options are presented in the design plans (Sheet 26) which satisfy the requirements of Rule 425 of Part 114, P.A. 451 (Rule 425). The final cover system for unlined areas meets the requirements of the original landfill design which included the areas that do not contain a geomembrane in the bottom liner system. Approximately 35.1 acres are currently closed in accordance with the requirements for unlined areas. However, 12.29 acres of this closed area will be overlain with overliner and vertically expanded. It includes an infiltration layer that is

comprised of a minimum of two (2) feet of 1.0 x 10^{-7} cm/sec compacted soil and an erosion layer containing one (1) foot of earthen material which is capable of sustaining vegetative growth.

The remaining site will utilize the following final cover system from bottom to top; an infiltration layer with a minimum thickness of eighteen (18) inches of compacted soil, a 40-mil textured low-density polyethylene geomembrane, an erosion layer with a minimum thickness of twenty-four (24) inches of which at least the bottom twelve (12) inches is granular drainage material, and a minimum thickness of six (6) inches of soil capable of sustaining vegetation.

In lieu of the twelve (12) inches of granular drainage material a double-sided geocomposite drainage layer may be used immediately above the geomembrane overlain by twenty-four (24) inches of general soil for the erosion layer, and a minimum thickness of six (6) inches of soil capable of sustaining vegetation.

10.1.3 Infiltration Layer

Depending on settlement of the surface of waste, additional waste or soil fill may be placed to attain bottom of cover grades. Final cover construction will commence after design waste grades are achieved. The waste will be overlain with a daily cover soil consisting of a minimum of six (6) inches of compacted soil placed in a manner appropriate for inclusion of the eighteen (18) inches of infiltration layer. The infiltration layer will have a maximum hydraulic conductivity of 1.0 x 10^{-5} cm/sec. Testing of construction materials for and placement of the infiltration layer shall be in accordance with the Construction Quality Assurance Plan (Attachment 9).

10.1.4 Barrier Layer

A 40-mil textured low-density polyethylene (LLDPE) geomembrane will be installed as the barrier layer in the final cover system. Engineering calculations that demonstrate that the geomembrane will not be subject to tensile stress during construction and post-closure of the landfill are included in the Engineering Report. The geomembrane specifications, testing rates and procedures are fully detailed in the CQA Plan. The CQA Plan also includes the methods of storage, handling and installation to be followed. LLDPE geomembranes that are currently on the market and that meet the specification in the CQA Plan are widely accepted in the solid waste industry and have been demonstrated to be resistant to degradation.

10.1.5 Erosion Layer

Following the installation of the geomembrane, a minimum of twenty-four (24) inches of soil shall be placed over the surface for protection. This soil shall be free of wood, stones, rubbish, or any other material which could potentially damage the geomembrane. At the Owner's discretion, either a minimum twelve (12) inches of permeable soil will be used in the lower portion of the erosion layer or a double-sided geocomposite will be used as the drainage layer.

If twelve (12) inches of granular soil is used for the drainage layer, it will be installed immediately over the geomembrane. It shall have a minimum hydraulic conductivity of 1.0 x 10^{-3} cm/sec and be placed and tested in accordance with the CQA Plan. The remaining twelve (12) inches of erosion layer shall consist of general site soil.

If a geocomposite drainage layer is used in lieu of the granular soil layer, it will be installed above the geomembrane. The geocomposite will be a double-sided geocomposite meeting the requirements outlined in the CQA Plan. The geonet portion will be tied using plastic cable ties and the top geotextile will be continuously sewn or heat bonded. The CQA Plan also includes the methods of storage, handling and installation to be followed. Double-sided geocomposites that are currently on the market and that meet the specification in the CQA Plan are widely accepted in the solid waste industry and have been demonstrated to be resistant to degradation. A total thickness of twenty-four (24) inches of erosion layer will be placed over the top of the geocomposite and will consist of general site soil.

10.1.6 Vegetative Growth Layer

The 6-inch vegetative growth layer shall be topsoil or other suitable soil capable of supporting grass growth. The material shall satisfy the requirements outlined in the CQA Plan. Topsoil should be free of waste, plants, weeds, tree roots, and large stones. This material need not be a manufactured or screened material. The topsoil should be placed in one lift with minimal compaction.

The topsoil shall be fertilized, seeded and mulched as needed to establish a thick grass cover to resist erosion and promote evaporation.

10.1.7 Closure Methods, Procedures and Processes

Within each cell, outside slopes will be brought to near-final grade, at which time interim cover will be placed. Interim waste grades will allow for settlement of the waste to occur before final

cap placement occurs. Interim cover will be seeded if it is anticipated that the area will remain inactive for more than six months.

Generally, installation of gas extraction wells will occur upon reaching near-final grades. The landfill gas wells are installed by drilling a 36-inch hole into the waste, coming no closer than 10 feet from the leachate collection system. Slotted or perforated pipe is placed in the hole followed by clean stone surround. The upper portion of the well is sealed with clay and tied into the gas collection header system.

After settlement of the waste surface has diminished, a final lift of waste or structural fill may be placed in order to attain top of waste grades. Vegetation and interim cover will be stripped prior to additional waste placement. The landfill may also choose to close landfill slopes below permit grade provided the top of waste is no steeper than 4:1, projected erosion is below regulatory limits and surface water controls function properly. Once a substantial area has attained final waste grade (approximately 10 acres), the MDEQ shall be given a notice of intent to close which will be placed in the operations record.

Cover materials and installation will be conducted in accordance with the CQA Plan in a manner that will minimize infiltration, erosion, maintenance and release of contaminated leachate or gas.

Final Closure of the landfill unit will commence within 30 days after the last receipt of waste occurs in that unit. Final closure of each unit will be completed within 180 days of starting that closure activity and certification will be submitted within 60 days after completion of closure construction activities. Extensions to this time period will be requested through the MDEQ.

In the event that it becomes necessary to close the landfill prior to attaining final grades, a final grade plan will be prepared that incorporates maximum 4:1 and minimum 4 percent grades. Revised cover drainage features will also be prepared in order to direct runoff to the sediment ponds and minimize erosion.

10.1.8 Maximum Open Extent

To the extent practicable, final cap will be placed as areas are brought to final grade. Because geomembrane is incorporated into the final cap, it is not cost-effective to close less than 10 acres at one time and sufficient anchorage must be provided if not closing the entire height of

the slope. Given these factors, it is estimated that the maximum area of waste placement at final grades without final cover is 150 acres. Most of this area will have interim cover placed to minimize leachate generation.

10.1.9 Maximum Inventory of Waste

The maximum inventory of waste on-site will occur when the entire site is brought to final grade. This maximum inventory is as follows:

Currently Permitted	25,152,000 cubic yards
Lateral and Vertical Expansion	31,845,000 cubic yards
TOTAL	**56,997,000 cubic yards**

10.1.10 Closure Schedule

The schedule for final closure of Ottawa County Farms Landfill, which includes the east expansion area and the overliner, is shown on Figures 10-1 through 10-3. The three figures show the Approximate Site Timeline, Typical Closure Schedule, and Final Closure Schedule.

10.1.11 Modifications to the Closure Plan

Modifications to the Closure Plan may be required over the life of the site to address changes in the site design, changing regulations or other changes that will affect the operation and closure of the landfill. Modifications to the Closure Plan will be submitted to the MDEQ for review and approval, as they are decided.

10.1.12 Location of Closure Plan

A copy of the closure plan shall be maintained in the facility operations' records.

10.2 POST-CLOSURE PLAN

Post-Closure activities will be conducted for a 30-year period following the final closure of the landfill. The purpose of the post-closure care is to maintain the environmental integrity of the landfill components. Post-closure activities will be in accordance with Rule 449 and will be conducted by the Owner. The contact information for post-closure activities is:

Ottawa County Farms Landfill
15550 68th Avenue
Coopersville, Michigan 49404
(616) 837-8195

10.2.1 Monitoring Activities

The monitoring program for the post-closure period of the site is described in the Environmental Monitoring Plan and Explosive Gas Monitoring Plan. Those systems requiring monitoring include the groundwater monitoring system, leachate collection system, and gas monitoring system.

10.2.2 Inspection Activities

During the post-closure period, the closed landfill will be inspected. Inspections and records of corrective actions shall be recorded and placed in the Operating Record. Deficiencies found during the inspection are to be corrected according to the schedule in Section 2.3 of this Plan. The following discusses those landfill systems that will be evaluated.

10.2.3 Final Cover System

The final cover system will be inspected for the following:

- Erosion;
- Burrowing animals;
- Stressed or inappropriate vegetation;
- Settlement of the waste;
- Ponding of water on the final cover;
- Localized subsidence;
- Areas of inadequate topsoil;

- Areas of slope instability or failure;
- Areas at the toe of the final cover slope for saturation;
- Areas of exposed liner.

10.2.4 Groundwater Monitoring System

During inspection of the environmental monitoring systems, the condition of groundwater monitoring wells will be checked for the condition of the ground seal, well and protective casing and locking caps.

10.2.5 Surface Water Controls

The surface water controls will be inspected as follows:

- Sedimentation basins will be checked for erosion and siltation, condition of discharge structures and inlets, and inappropriate vegetation;
- Ditches will be checked for siltation, stressed vegetation, and erosion;
- Culverts will be checked for siltation and clogging; and
- Diversion berms and spillways will be checked for erosion, ponding and washout.

10.2.6 Leachate Collection System

The leachate collection and transfer system will be inspected as follows:

- Cleanouts will be visually checked for the condition of the pipe, and presence of locking caps;
- The pumping systems will be visually inspected for the condition of pumps, manholes, vaults and pump controls. The overall system operation, particularly the operating characteristics of the pumps and controls, will be evaluated by comparing the actual operating characteristics with the system design. Proper adjustments will be performed, if necessary, to bring the system into compliance with the approved design parameters;
- Transfer piping will be checked for the condition of the pipe, condition of sampling ports and manholes, and the condition of discharge; and
- Sideslopes will be checked for leachate outbreaks.

10.2.7 Gas Extraction Systems

The gas extraction system will be inspected as follows:

- Gas collection equipment and other appurtenances that penetrate the final cover will be checked for damage; and
- Gas mover equipment and flares will be checked for proper operation.

10.2.8 Site Security and Access Controls

The site will be checked to determine the condition of the fencing and gates at the site, and the condition of the screening berms and signs.

10.2.9 General Site Condition

The overall site condition will be checked for unauthorized use of the facility and general maintenance.

General maintenance will include the following:

- Mowing and fertilizing grass covered areas; and
- Cleaning of sediment basins, as needed.

Mowing shall be done a minimum of 2 times per year. Other general maintenance will be performed as needed.

10.2.10 Maintenance and Record Keeping Activities

The Owner will perform routine maintenance on the closed landfill as dictated by the results of the inspection program discussed above.

Maintenance required on the final cover system will be completed in accordance with the following schedule:

- Exposed waste resulting from erosion of final cover will be covered within 10 days, weather permitting;
- Necessary repairs to the final cover system, including the placement of the protective soil layer or vegetative growth layer material and the seeding fertilizing and mulching of repaired areas will be completed within 30 days of the site inspection, weather permitting.

Maintenance on the Hydrogeologic monitoring system will be completed prior to the next scheduled sampling event.

Maintenance on the surface water control system will be completed within 60 days of the site inspection.

Maintenance on the leachate collection system will be completed within 30 days of the site inspection, except for maintenance on the pumps and pump control system, which will be completed within 90 days of the site inspection. The facility will rent, lease or buy additional pumps during the interim period, if needed.

Maintenance on the methane gas collection system will be completed within 30-days of the site inspection.

If a repair cannot be completed in accordance with this schedule, the facility will provide an alternate schedule with justification to the regulatory agency. The facility will take interim measures necessary to ensure the facility is operated in accordance with regulatory requirements until repairs are made.

Following closure of the landfill, similar records to those required during site operation will be maintained with regard to the following items:

- Leachate quality, generation and treatment, and depth in sumps;
- Modifications to the approved Post Closure Plan and relevant cost estimates;
- A summary of operator inspections throughout the year;
    a. Methane gas, groundwater and surface water monitoring results;
    b. These records will be maintained throughout the post-closure period of the facility or as required by regulations.

10.2.11 Final Use

After final closure, the site will be left as an open space and natural wildlife habitat.

10.2.12 Modifications to the Post Closure Plan

Modifications to the Post Closure Plan may be required over the life of the site to address changes in the site design, changing regulations or other changes that will affect the operation and closure of the landfill. Modifications to the Post Closure Plan will be submitted to the

MDEQ for review and approval. Modifications shall be prepared and sealed by a professional engineer.

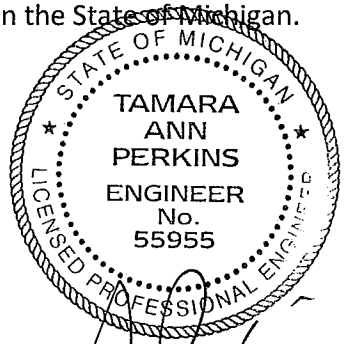
10.2.13 Location of the Post Closure Plan

A copy of the approved Post Closure Plan will be maintained in the facility operating records.

10.3 ENGINEER CERTIFICATION

The Closure and Post-Closure Plan were prepared under the supervision of a professional engineer licensed in the State of Michigan.

Engineer's Seal

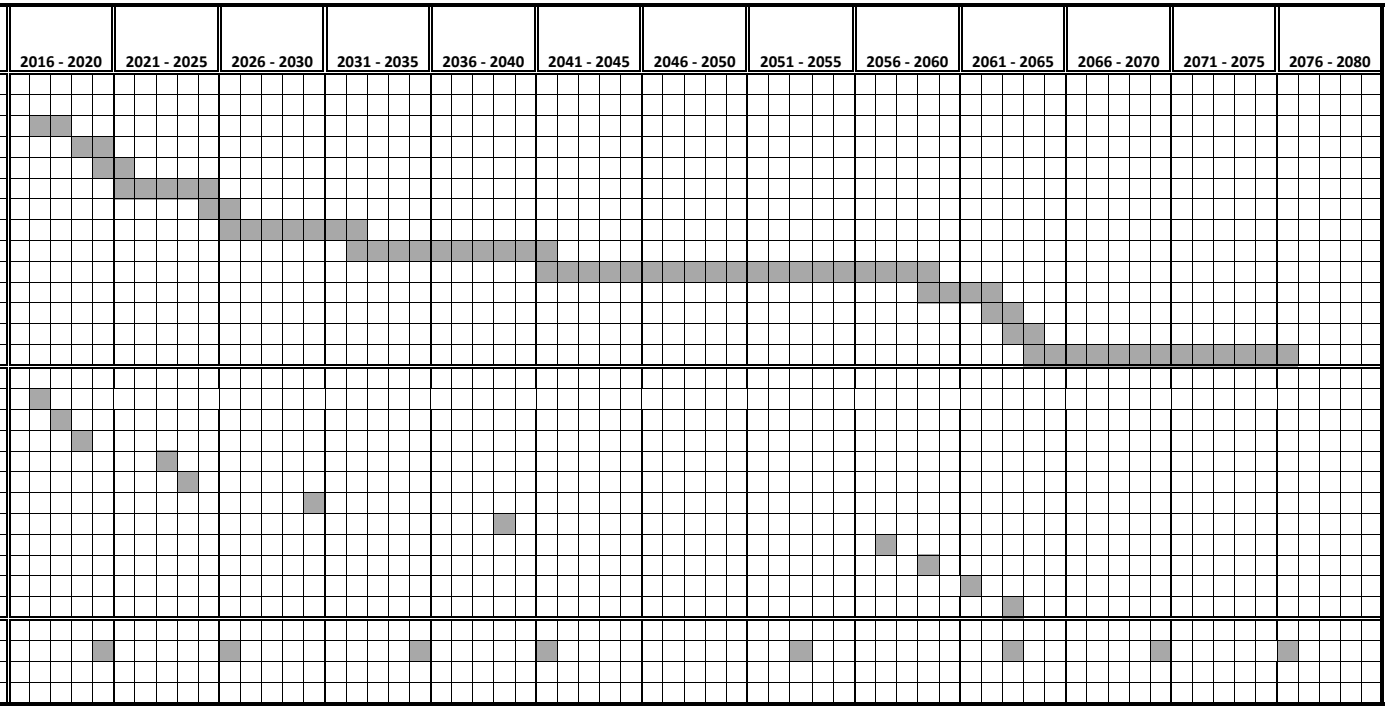


Signature: _____

Date: 5/20/16

FIGURE 10-1
Approximate Site Timeline
Ottawa County Farms Landfill
Construction Permit Application

Task Name	Expanded Airspace (Cubic Yards)[1]	Estimated Life (Years)[2]	Start	Finish
WASTE PLACEMENT				
				May-16
Phase 7B	600,000	1	Present	May-17
Phase 9	879,000	1.5	May-17	Oct-18
Phase 10	729,000	1.3	Oct-18	Feb-20
Phase 14 Overliner	2,106,000	3.6	Feb-20	Sep-23
Phase 11	994,000	1.7	Sep-23	Jun-25
Phase 12	3,241,000	5.5	Jun-25	Dec-30
Phase 13	5,372,000	9	Dec-30	Dec-39
Phase 15 Overliner	11,099,000	18.5	Dec-39	May-58
Phase 16A Overliner	1,303,000	2.2	May-58	Aug-60
Phase 8A	603,000	1.1	Aug-60	Sep-61
Phase 16B Overliner	1,074,000	1.8	Sep-61	Jul-63
Phase 8B	7,888,000	13.2	Jul-63	Sep-76
CELL CONSTRUCTION				
Phase 9			Spring 2017	
Phase 10			Summer 2018	
Phase 14 Overliner			Summer 2019	
Phase 11			Spring 2023	
Phase 12			Spring 2024	
Phase 13			Summer 2030	
Phase 15 Overliner			Summer 2039	
Phase 16A Overliner			Summer 2057	
Phase 8A			Spring 2059	
Phase 16B Overliner			Spring 2061	
Phase 8B			Spring 2063	
APPROXIMATE CLOSURE EVENTS				
Partial Closure Events				
Final Closure			Summer 2077	



Notes:

1. Expanded airspace volume is based on interim grading plan for each Phase development.
2. Estimated life in years is based on anticipated filling rate of 600,000 cubic yards per year.
3. Phases showing estimated life beyond 2 years may be constructed in small sections to accommodate operational needs.

FIGURE 10-2
Typical Closure Schedule
Ottawa County Farms Landfill
Construction Permit Application

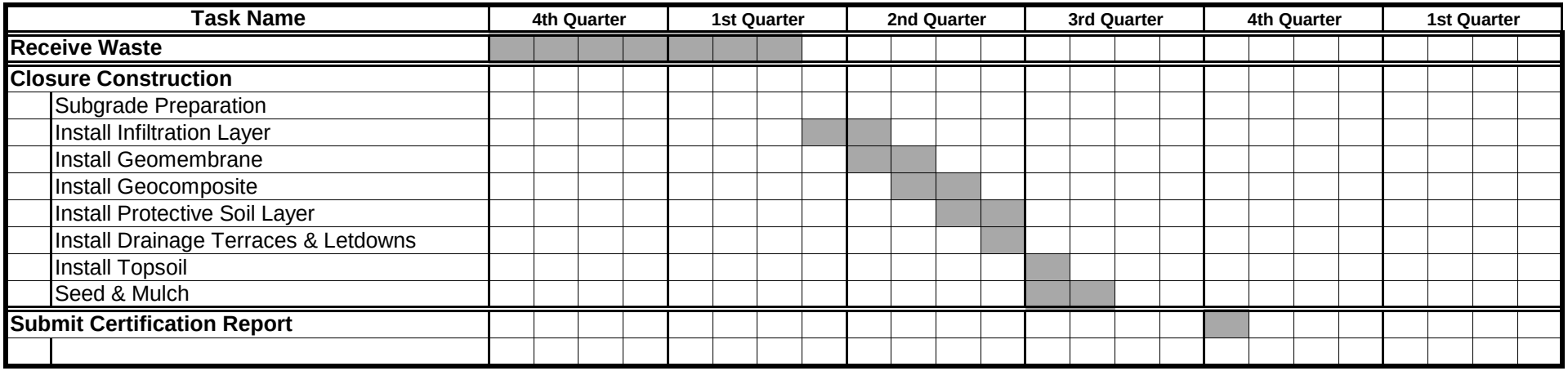


FIGURE 10-3
Final Closure Schedule
Ottawa County Farms Landfill
Construction Permit Application