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*Protecting, Enhancing, and Restoring Our Environment*

**2021 Permit Application**  
**Attachment B6 Engineering Plans**

**Introduction**

This report provides the technical basis for landfill design improvements to Master Cell VI (MC-VI) requested in Wayne Disposal Inc.'s (WDI) 2021 Part 111, Hazardous Waste Operating License renewal application. The improvements being requested include:

- Adjusting the MC VI-G1 through G7 (here in referred to as MC VI-G) base liner to improve the leachate management operations and provide additional leak detection capabilities. The proposed upgrades include the addition of dedicated leachate collection and leak detection sumps for each cell in MC VI-G.
- Enhancing the final cover design with the use of a geosynthetic engineered artificial turf final cover system.
- Improving the geometry of the final grade in order to improve the storm water management system

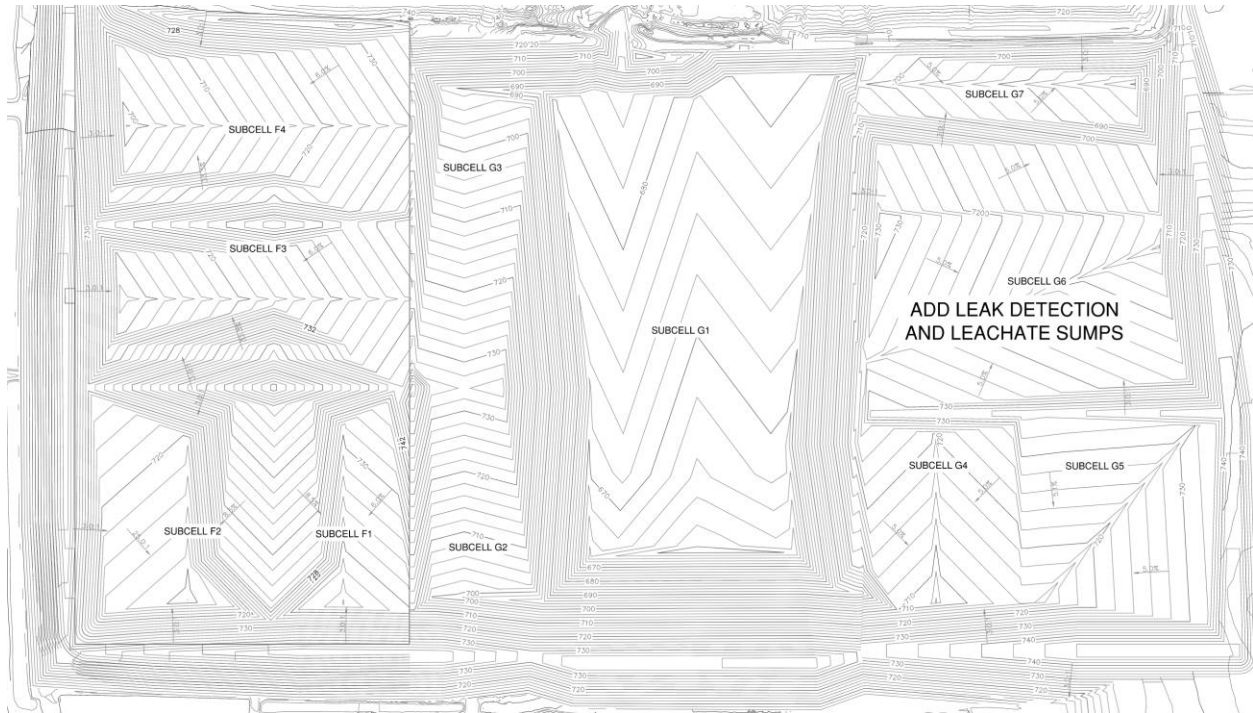
The design improvements at WDI alter the theoretical hazardous waste design capacity of the facility. As a result, WDI also requested to update the permit capacity to reflect the adjusted theoretical hazardous waste design capacity. Calculations, included in Attachments A and B of this section, provide the basis for design of the alternative final cover system. A complete set of permit engineering drawings is included in Attachment C of this section for ease of review and reference.

CTI and Associates, Inc. (CTI) is providing a summary of the methodology used to evaluate the upgrades and recommendations along with supporting documentation, which includes calculations and the revised permit engineering drawings.

**Master Cell VI-G4 through G7 Upgrade**

The proposed upgrades to MC VI-G include a liner grade change to facilitate the addition of dedicated leachate collection and leak detection sumps for each cell including MC VI-G4 through G7. To incorporate these sumps into the design, cell layouts have been modified to allow for optimal flow of the leachate collection and leak detection systems. Figure 1 displays the proposed area of the MC VI-G base liner grades and layout.

**Figure 1. Proposed Master Cell VI-G Layout**



### Final Cover Grade

Prior to the 2012 WDI landfill capacity expansion, the Willow Run Airport Runway 14/32 restricted the height of the vertical boundary of the landfill. The runway was removed in 2014, allowing WDI to reevaluate the geometry of the final grade. This proposed change allows the geometry of the final grade to have a more consistent slope, which will allow for a more controlled and direct storm water management system.

**Figure 2. Proposed Final Grades**



### **Alternative Final Cover – Engineered Artificial Turf Landfill Cover System**

As part of this submittal, WDI is proposing an alternate to the final cover system design. The alternative final cover is an engineered three component system comprised of a structured geomembrane, an engineered turf, and a specialized sand infill. The foundation of the system is an impermeable, highly transmissive structured geomembrane. The engineered turf component gives the system the appearance of grass while eliminating the maintenance challenges associated with a vegetation-based system (e.g., mowing, erosion). The specialized sand infill component is placed between the blades of the engineered

turf and allows the system to be trafficked while also providing enhances UV protection. The engineered alternative final cover system is fast and easy to install for an aesthetically pleasing, cost-effective landfill closure solution. During post closure, the proposed alternative cover system is highly erosion resistant, very low maintenance and easy to repair on the rare occasions it is needed. Details and calculations in support of this proposed alternate are included in Attachment B of this section.

### **Summary of Design Capacity**

WDI's currently permitted design capacity is approximately 22,453,720 million cubic yards of hazardous waste. The original hazardous waste capacity was 11,000,000 cubic yards. However, the Willow Run Airport Runway 14/32 that existed at the time of the original permit restricted the height of the vertical boundary, which limited the hazardous waste capacity to 10,723,720 cubic yards. In 2012, the MC VI-F/G expansion increased the capacity by 11,730,000 cubic yards.

As part of this submittal, the final grade elevations of MC IV-G2 and MC VI-G3 are being adjusted to their original configuration which was revised in 2018 to ensure a net zero capacity change with a geocomposite clay liner design. Additionally, the area previously restricted by Willow Run Airport Runway 14/32 has been adjusted to improve the storm water management system and increase the maximum elevation to 930 feet above mean sea level. This adjustment will result in an increased capacity of 3,871,240 cubic yards. The floor grades (in MC VI F and G) have been adjusted to include leachate collection and leak detection sumps. Adjusting the floor grades results in an increase in capacity of 149,906 cubic yards.

The use of an alternative final cover system design provides approximately 687,764 cubic yards of capacity.

The total net gain in the hazardous waste capacity incorporating the sum of these adjustments is 4,708,910 cubic yards.

### **Design Calculations**

In order to add leachate collection and leak detection sumps, the base liner grades in MC VI-G were revised and cell layouts were updated. The grades of the final cover have been adjusted to allow for more controlled and direct storm water management. Design calculations to support the liner grade and final cover grade changes are included in Attachment A of this section. Calculations contained in Attachment A of this section include:

- Geotechnical Slope Stability Analysis (Attachment A-1)
- Geotechnical Settlement Calculations (Attachment A-2)
- Pipe Strength and Deflection Calculations (Attachment A-3)
- Leachate Collection System Flow Capacity Analysis (Attachment A-4)
- Head-on-Liner Calculations (Attachment A-5)
- Surface Water Calculations (Attachment A-6)

The design calculations related to the engineered artificial turf landfill cover system are included in Attachment B of this section.

### Permit Drawings

The proposed upgrades to the MC VI-G base liner and WDI final grades will result in revisions to the permit engineering drawing sheets listed in Table 1. A complete set of permit engineering drawings is included in Attachment C of this section for ease of review and reference.

**Table 1.** List of Revised Permit Engineering Drawings

Sheet	Title
01	Title Sheet
02	General Site Plan
03	Construction Phasing
04	Top of Subgrade Grading Plan
05	Top of Secondary Liner Grading Plan
06	Top of Primary Liner Grading Plan
07	Leachate Management Plan
08	Final Cover Grading Plan (1 of 2)
09	Final Cover Grading Plan (2 of 2)
10	Stormwater Management and Sedimentation Plan (1 of 2)
10A	Engineered Turf Stormwater Management Plan (1 of 2)
11	Stormwater Management and Sedimentation Plan (2 of 2)
11A	Stormwater Management and Sedimentation Plan (2 of 2)
12	Cross Sections (1 of 3)
13	Cross Sections (2 of 3)
14	Cross Sections (3 of 3)
15	Liner System Details (1 of 2)
16	Liner System Details (2 of 2)
17	Leachate Collection System Details (1 of 2)
18	Leachate Collection System Details (2 of 2)
19	Final Cover Details
19A	Engineered Turf Final Cover Details
20	Stormwater Management System Details
20A	Engineered Turf Stormwater Management System Details
21	Conceptual Gas Venting System

**List of Attachments to This Section**

**Attachment A: Design Calculations**

- Attachment A-1: Slope Stability Analysis
- Attachment A-2: Settlement Calculations
- Attachment A-3: Pipe Strength and Deflection Calculations
- Attachment A-4: Leachate Collection System Flow Capacity Analysis
- Attachment A-5: Head-on-Liner Calculations and Minimum Geocomposite Transmissivity
- Attachment A-6: Surface Water Calculations

**Attachment B: Engineered Artificial Turf Landfill Final Cover Alternate**

**Attachment C: Permit Engineering Drawings (under separate cover)**

