SECTION 4

STORMWATER MANAGEMENT PLAN

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4 STORMWATER MANAGEMENT PLAN

Introduction

The purpose of this report was to summarize and evaluate the permitted stormwater management plan to ensure that all permitted ditches and basins are adequately sized to manage stormwater from the permitted final landform. Additionally, this report describes the results of additional analyses which were performed to evaluate interim stormwater flow during construction and operation of the proposed Chemical Waste Unit. The interim condition which was evaluated within this Application assumed that the proposed Chemical Waste Unit was filled to capacity with the intermediate (interior) Chemical Waste Unit and Municipal Solid Waste Unit slopes directing stormwater to either a terrace ditch, or to a temporary ditch between the Chemical Waste Unit and the adjacent Municipal Solid Waste Unit (refer to Drawing D15). Ultimately, the "wedge" between the Chemical Waste Unit and the Municipal Solid Waste Unit will be filled as described within Section 3. The analyses performed by Shaw, as well as the IEPA permitted Stormwater Calculations are provided within Appendix J of this Application.

1. *Stormwater Overview.* Stormwater along the final landform will be directed along terrace berms to letdown pipes or rip-rap lined downchutes which will convey the stormwater into perimeter ditches located outside of the waste boundary. During interim conditions, the inner side slopes will drain to either an interim terrace berm or to a interim ditch located on the separation berm between the Chemical Waste Unit and MSW Unit. Stormwater within the separation berm ditch will then be pumped into the nearest perimeter ditch. Stormwater runoff will then be conveyed through the perimeter ditches to Sediment Basin B which is located south of the landfill. The sediment basin will allow the controlled and gradual release of clear stormwater runoff into an unnamed tributary of the nearby Salt Creek.

   All stormwater structures have been designed to safely pass the 100-year, 24-hour or 100-year, 1-hour storm event (whichever provided the highest peak discharge) during interim and final conditions. As such, this design exceeds both federal and state requirements which only stipulate safe passage of the 25-year, 24-hour storm event. The stormwater management system has been designed to convey stormwater away from the landfill. Any stormwater which contacts waste will be contained and treated as leachate and will not be discharged to off-site waterways.

2. *Terrace Berming.* The slopes of the final landform will feature terrace berming to reduce the potential for erosion along the slopes. The terrace berms will intercept sheet flow of stormwater along the final landfills slopes. The stormwater will then be diverted down a letdown pipe into the perimeter ditches. The interior slopes of the interim conditions will use terrace berms to direct the majority of water to the perimeter ditches.

3. *Interim and Perimeter Ditches.* All interim (interior) and perimeter ditches have been designed to safely pass the peak discharge generated by the 100-year, 1-hour storm event, which was used because it conservatively provided the highest peak discharge. The use of the 100-year, 1-hour storm event produced the critical peak discharge, and therefore was used to size the new ditches and verify the adequacy of all other on-site ditches.

4. *Low Flow Velocities*. All drainage ditches have been designed to maintain the lowest possible flow velocities during the 100-year flood event. These low velocities help minimize the potential for erosion of the drainage ditches, and prevent the scour of embankments at culvert outlet points. Any ditch or discharge point where flow velocities exceed 5 fps will be protected using riprap, sodding, erosion control matting, or other control measures to minimize erosion.

5. *Stormwater Detention Basin*. All stormwater runoff from the chemical waste unit which does not contact waste will be routed to Sediment Basin B. This stormwater basin will improve the water quality prior to discharge by facilitating sedimentation and supporting aquatic vegetation. The design of the stormwater detention basin includes provided adequate distance between the inlet and outlet structures to promote sedimentation.

6. *Storage of the 25-year Storm Runoff Volume*. Sediment Basin B has been designed to retain all runoff from the 25-year, 24-hour storm event during interim and final conditions. The spillway has been designed to safely convey the water from the 100-year, 24-hour storm event.

7. *Staged Outlet Structure*. The stormwater basin will safely pass the 100-year storm event over the spillway. The stormwater basin has been designed with a perforated standpipe connected to a 24" culvert with a valve. The valve will remain closed until the detained water has cleared of sediment, at which point the valve will be open to control the release of clear water.

8. *Isolation of Stormwater From Waste*. All stormwater runoff will be diverted around the active landfill areas and, after final closure, from the final landform. The stormwater management system will prevent ponding of water on the final landform, thereby minimizing the possibility for surface water to migrate through the cover and create leachate. All drainage ditches and stormwater detention basins are located outside the waste footprint to reduce the possibility of surface water infiltrating the final cover and becoming leachate.

Landfill waste will be covered at the end of each operating day. This cover will be maintained and will prevent stormwater runoff from contacting any waste or leachate. All of these components have been designed to safely pass the 100-year storm events or larger, and all emergency overflows have been designed to direct stormwater away from the landfill in the event of a major storm event. Any stormwater which contacts leachate or waste will be contained and treated as leachate.

Stormwater Requirements

The existing Clinton Landfill No. 3 has an existing IEPA permitted Stormwater Management Plan (refer to Appendix J). Additionally, the existing Clinton Landfill No. 3 has a permit issued through the Federal National Pollutant Discharge Elimination System (refer to Appendix J). Drawing Nos. D15 through D18 illustrate the location of all structures affected by stormwater runoff from disturbed areas and detailed designs of all structures to be constructed.

The following sections demonstrate that the proposed design of the Clinton Landfill No. 3 Chemical Waste Unit and meet and exceed all of the applicable requirements.

Physiography and Topography

As shown on Drawing No. D3, the waste boundary of the permitted Clinton Landfill No. 3 encompasses approximately 157.45 acres. The proposed Chemical Waste Unit would occupy approximately 22.50 acres of the permitted waste boundary. The facility is located within Sections 10, 11, 14 and 15, Township 19 North, Range 2 East of the Third Principal Meridian.

Any field tiles encountered during the development of the landfill will be managed to ensure proper drainage and discharge so as not to adversely impact upstream or downstream property owners.

The stormwater management system has been designed to prevent runoff from the 100-year, 24-hour precipitation event from entering disturbed areas. During development of the facility, runoff from undisturbed areas shall be directed around disturbed areas for any precipitation event to the extent practical. Should runoff from undisturbed areas become commingled with runoff from disturbed areas, it will be properly managed as part of the facility's stormwater management system.

Precipitation Data

Precipitation data for the study area was obtained from the Illinois State Water Survey's Bulletin 71, Rainfall Frequency Atlas of the Midwest. The total precipitation and storm duration are summarized in Table 4-1. Based on the information provided in Bulletin 71, the rainfall distribution of the 1-hour and 24-hour storm events for the 100-year, 25-year and 2-year (to calculate time of concentration), which correspond to the SCS Type II distribution pattern that is representative of regional storm events. Rainfall distributions are summarized in Appendix J.

TABLE 4-1
STORM FREQUENCIES AND VOLUMES

Recurrence Interval	24-Hour (inches)	1-Hour (inches)
100-Year	6.92	3.25
25-Year	5.32	2.50
2-Year	3.02	1.42

Regulatory 100-Year Floodplain Limits

The most recent flood map for the proposed facility is the Flood Insurance Rate Map for DeWitt County, Illinois, Panel Nos. 17039C0325 D, 17039C0310 D, and 17039C0190 D. A copy of the maps are provided in Appendix D. No portions of the permitted Clinton Landfill No. 3, including the proposed Chemical Waste Unit, is located within the 100-year floodplain as determined by the Flood Insurance Rate Maps.

Developed Site Conditions

Design Drawing Nos. D12 and D14 depict the interim waste and final landforms of the proposed Chemical Waste Unit. The final slopes on the proposed landfill are typically no steeper than 25 percent and no flatter than 5 percent. The landfill will be approximately 871 feet above MSL. Above grade portions of the landfill will be completed with a final cover that satisfies all state, local, and federal requirements. Such a cover will form a barrier to prevent infiltration of rainfall into the landfill. To minimize erosion, healthy, quick-growing grasses will be planted.

The Stormwater Management Plan has been designed to accommodate fully-developed conditions of the landfill and ancillary facilities. Runoff from the development of the Chemical Waste Unit will be directed into Sediment Basin B using a series of letdown pipes/rip-rap lined downchutes, terrace berms, and perimeter ditches. The detention basin will discharge into an unnamed tributary of Salt Creek.

Interim Site Conditions

Design Drawing No. D15 depicts the Interim site conditions. The inner slopes of the Chemical Waste Unit are no steeper than 33 percent and no flatter than 5 percent. The inner (interim) slopes of the MSW Unit are 33 percent. Outer slopes are no steeper than 25 percent and no flatter than 5 percent. All slopes were conservatively assumed to be bare during interim conditions.

The Stormwater Management Plan has been designed to accommodate these interim conditions of the landfill and ancillary facilities. Runoff from the interim conditions will be directed into Sediment Basin B using a series of terrace berms and perimeter ditches. The basin will discharge into an unnamed tributary of Salt Creek.

Detention Basins

Three detention basins will be utilized to manage stormwater runoff from the entire Clinton Landfill No. 3 final landform. All runoff from the Clinton Landfill No. 3 Chemical Waste Unit will be directed to Sediment Basin B. The basins will improve the water quality and control the release rate of stormwater runoff. The stormwater basins will provide both live storage and sedimentation of incoming stormwater runoff.

The basins have been designed with excess capacity to safely retain all runoff from the 25-year, 24-hour storm event and discharge runoff from the 100-year storm event. Further information about the sedimentation characteristics of the basin design is discussed within the erosion and sediment control section of the report.

The elevation of the perforations on the outflow standpipes will dictate the normal water surface elevation within the sedimentation basins. The normal water surface of the basins will be approximately elevation 722 feet above MSL for Sediment Basin A, 656.5 feet above MSL for Sediment Basin B, and 662.5 feet above MSL for Sediment Basin C. The basin sidewalls will be constructed with 3 feet horizontal to 1 foot vertical sideslopes.

Each sediment basin contains a 60" diameter standpipe that is connected to a 24" PVC or polyethylene outlet pipe as shown of Design Drawing No. D8. Additionally, each sediment basin contains a grass lined spillway with a 25-foot minimum bottom width (Basins B and C are designed with a 30-foot minimum bottom width) and 5H:1V sideslopes. Table 4-2 summarizes the various basin design parameters for each basin.

TABLE 4-2 BASIN DESIGN PARAMETERS			
Basin Characteristics	**Sediment Basin A**	**Sediment Basin B**	**Sediment Basin C**
Top of Berm Elevation (feet above MSL)	731.0	674.0	674.0
Spillway Elevation (feet above MSL)	727.0	670.5	670.6
Inlet Culvert Elevation (feet above MSL)	722.0	665.0	681.0
Perforation Invert Elevation (feet above MSL)	722.0	656.5	662.5
24" Outlet Culvert Invert Elevation (feet above MSL)	719.5	653.5	660.0
Surface Area at Spillway Elevation (acres)	6.86	2.36	3.40

The outlet pipe for each detention basin contains a valve that can open or close the outlet structure. It is intended that the valve will remain closed so that the detention basin retains stormwater runoff. The valves will be opened, i.e. basins will be drained, once the detained water has cleared excessive sediment or during periods of extreme storm events.

Perimeter Ditches

As shown on Drawing Nos. D15 and D16, there are perimeter ditches located around the perimeter of the waste boundary of the proposed landfill. The perimeter ditches convey stormwater from the landfill's interim and final slopes to the basins. The perimeter ditches have been designed with excess capacity to safely convey the greater flow rates of the 100-year, 1-hour (or 24-hour) storm event. The perimeter ditches are designed for low maintenance after the landfill is vegetated. The perimeter ditch bottoms will be lined with 2 feet of low permeability cohesive soil (if the in-situ soils at the excavation grades are not adequate enough to retain water) and vegetated with grasses. The perimeter ditches are designed with side slopes no steeper than 2H:1V, and a bottom width between 2 and 6 feet. The perimeter ditches slope between 0.30% to 6.53% toward the basins. The wide grassed bottoms will promote sedimentation and foster a natural environment. The perimeter ditches have been adequately sized to handle the 100-year, 1-hour storm event for rainfall onto the final landform, this design was previously approved by the Illinois Environmental Protection Agency. Table 4-3 presents design parameters for the perimeter ditches affected during the interim conditions. Calculations demonstrating that the perimeter ditches are sufficiently sized are presented in Appendix J.

Terrace Berms

Terrace berms are utilized around the permitted final landform in order to intercept stormwater and direct it to letdown pipes in order to minimize erosion of the final cover. Additionally, in order to minimize the amount of runoff into the ditch separating the MSW Unit and Chemical Waste Unit portions of the landfill, terrace berms will be installed in the interim slopes as appropriate to direct water from the inner slopes to the perimeter ditches. The terrace berming will intercept sheet flow of stormwater during interim conditions. The terrace berms will be constructed perpendicular to the slope of the landfill. All terrace berms will have triangular cross sections. The maximum side slope of the berm will typically be 2H:1V, with enough depth to accommodate the peak runoff flow rate from the 100-year, 1 hour storm event. Terrace berms will typically be developed as shown on Drawing Nos. D15 and D16. Refer to Drawing No. D17 for typical terrace details.

TABLE 4-3
DITCH/BERM DESIGN PARAMETERS - INTERIM CONDITIONS

	Length (feet)	Slope (ft/ft)	Side Slope (H:V)	Channel Bottom Width (feet)	Channel Depth (feet)
A	606	0.0084	2:1	6	3.0
B	1327	0.0045	3:1 & 2:1	0	3.0
C	936	0.0171	3:1 & 2:1	0	3.0
D/I	841	0.0050	3:1	7	3.0
E/F	1047	0.0050	3:1	7	3.0
G	1028	0.0050	3:1 & 2:1	0	3.0
H	818	0.0024	3:1 & 2:1	0	3.0
J	298	0.0084	2:1	6	3.0
K	683	0.0395	2:1	6	3.0
L	1131	0.0044	2:1	6	3.0
M	146	0.0068	2:1	6	6.7
N	450	0.0113	2:1	6	1.5

Note:
1. The ditch is labeled according to the subarea that it drains.
2. Ditches were designed using a Manning's n value of 0.030. Berms were designed using a Manning's n value of 0.023.

Letdown Pipes

The final landform will have letdown pipes which will be constructed to convey the stormwater collected by the terrace berms down the slope of the landfill into the perimeter ditches.

Hydrologic Analysis

A hydrologic analysis of the facility was performed to evaluate the proposed stormwater management plan during interim and final conditions. The computer model HEC-HMS was used to develop discharges for various storm events at strategic locations within the facility. HEC-HMS is distributed by the US Army Corp of Engineers and can be downloaded from the following website: http://www.hec.usace.army.mil/software/hec-hms/download.html. Runoff was evaluated for 24-hour and 1-hour durations and for the 25-year and100-year storm frequencies. This analysis exceeds all local, state, and federal requirements for landfills.

Based on information obtained in Bulletin 71, a SCS Type II pattern was utilized to develop a synthetic rainfall distribution for the various storm events. Both 1-hour and 24-hour durations were analyzed to determine which storm duration produces the larger peak discharge and detention requirements. Results of the hydrologic analysis indicate that the 1-hour duration produces a larger peak discharge. Therefore, all stormwater structures were designed to adequately handle the peak 100-year, 1-hour storm event. References for total rainfall and rainfall distributions are presented in Appendix J.

A hydrologic model of the interim conditions was prepared. Watersheds for the interim conditions were delineated as shown in Figure 4-1. A curve number and SCS lag time was calculated for each watershed. The curve number represents the amount of runoff potential. The lag time is a function of the time for runoff to travel through the area. These parameters are entered into the HEC-HMS models and influence the shape and peak of the runoff hydrograph produced by the model.

The curve number for areas at final grade on the landfill were assumed to be 85 in order to be conservative. Areas within the waste boundary not at final grade were given the conservative curve number of 90. Areas where gravel is most prevalent were assigned curve number of 95.

Time of concentration (Tc) and SCS lag time for each watershed were also calculated using distances, slopes, and surface types of the longest flow path through each watershed. Detailed calculations determining curve number and lag time are presented in Appendix J.

For the analysis of interim conditions, the study areas used were those areas which drain to Sediment Basin B. These areas were subdivided into 15 watersheds. The area of the portions of the landfill not flowing to Sediment Basin B will remain the same size or become smaller during the interim conditions, therefore the areas flowing to Sediment Basin A and Sediment Basin C were not evaluated during the interim conditions.

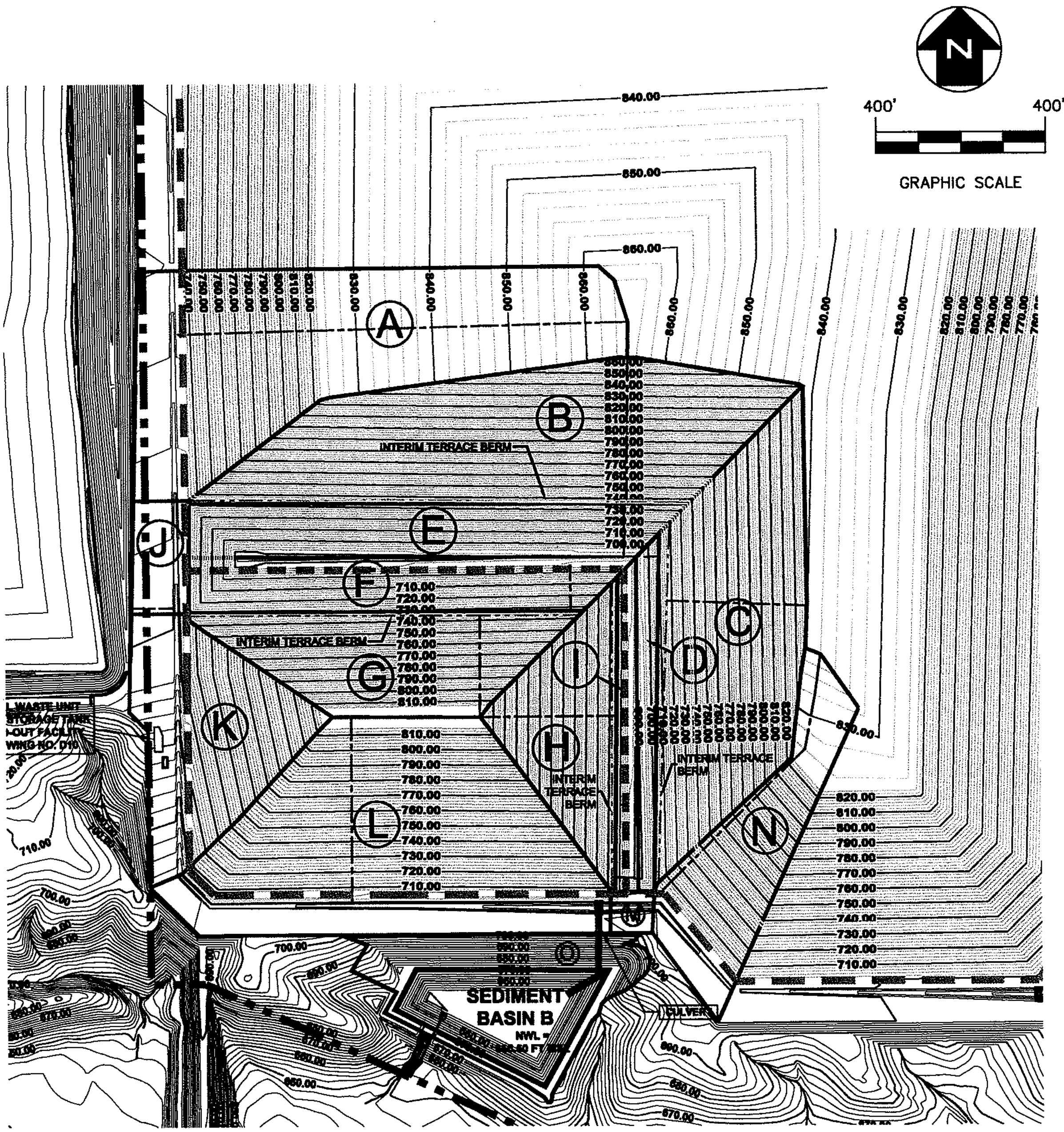
The analysis for final conditions was performed to demonstrate that the permitted Stormwater Management design was adequately sized to handle the 100-year, 1-hour and 24-hour rainfalls. Refer to Appendix J for further details regarding this analysis.

Hydrologic Results

Hydrologic results showing discharge-frequency relationships for the interim condition subareas are presented in Table 4-4. Tables 4-5 and 4-6 illustrate results for the ditches and basins, respectively.

The results demonstrate that the design of the drainage ditches/berms will be adequate to safely convey the 100-year storm event. The maximum velocity of the drainage ditches has been modeled to evaluate the potential for erosion and scour of the ditches and berms. Rip-rap, fabric formed concrete or erosion control materials (ECMs) will be placed in all ditches that have a peak velocity that exceeds 5 feet per second in order to minimize potential erosion and scour.

Results also indicate that the basins have been designed to protect both the property and downstream areas from flooding. The basins will have more than adequate capacity to retain the 25-year storm event without accessing the emergency spillway. The basins and ditches are designed to meet or exceed the state capacity requirements of the 25-year, 24-hour storm event. For larger events, discharge will pass safely over the emergency spillway of the basin, and will not overtop basin sidewalls.



LEGEND

- APPROXIMATE FACILITY BOUNDARY
- APPROXIMATE PERMITTED WASTE BOUNDARY
- DRAINAGE AREA DIVIDE
- TIME OF CONCENTRATION FLOW LENGTH
- TERRACE BERM

NOTES

1. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.

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CHEMICAL WASTE LANDFILL
CLINTON LANDFILL NO. 3

FIGURE 4-1
WATERSHED DELINEATION
INTERIM CONDITIONS

APPROVED BY:	DAM	PROJ. NO.:	128017	DATE:	OCT 2007

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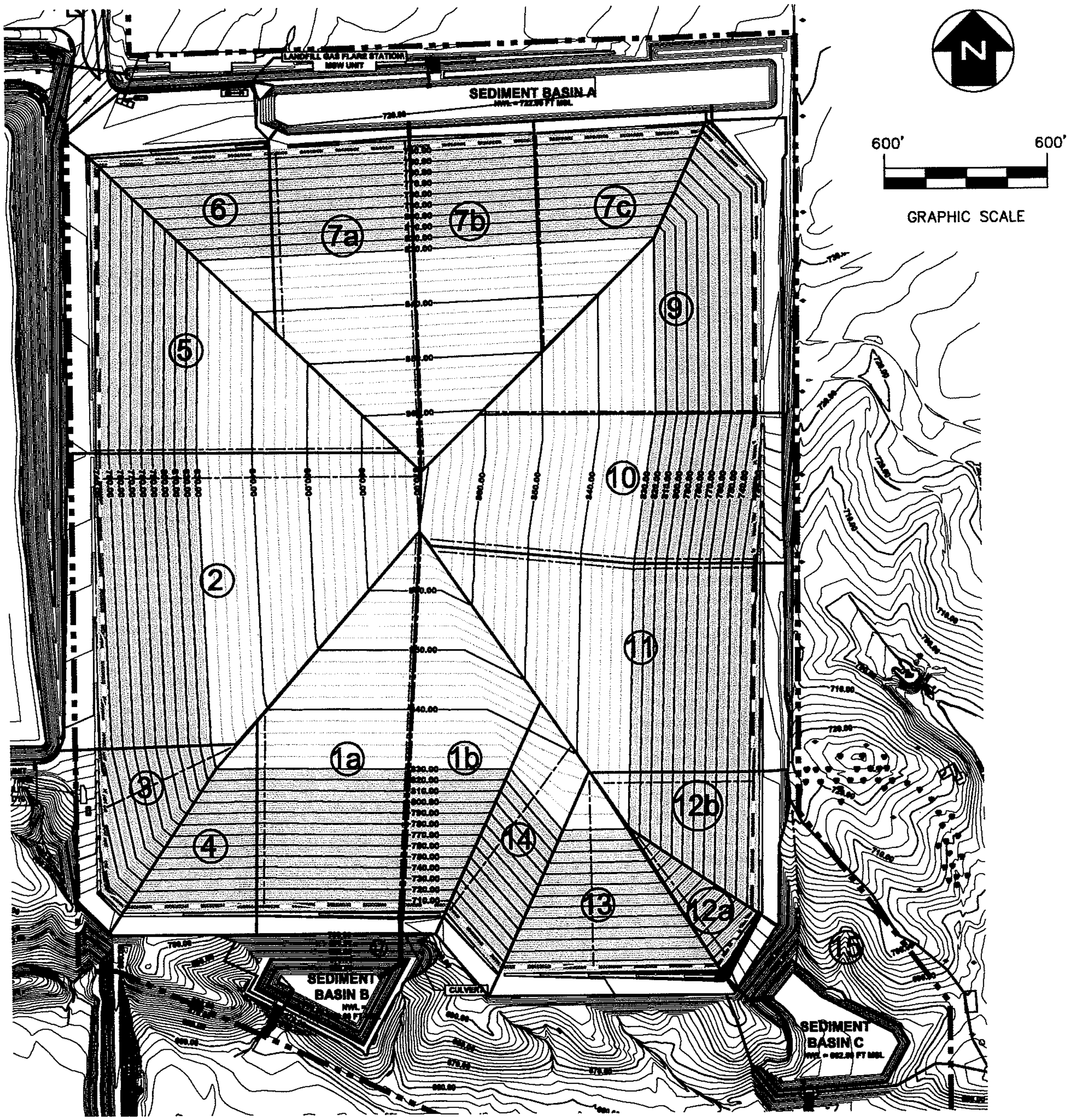

LEGEND

APPROXIMATE FACILITY BOUNDARY

APPROXIMATE PERMITTED WASTE BOUNDARY

DRAINAGE DIVIDE

TIME OF CONCENTRATION FLOW LENGTH

NOTES

1. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.

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CHEMICAL WASTE LANDFILL
CLINTON LANDFILL NO. 3

FIGURE 4-2
WATERSHED DELINEATION
FINAL CONDITIONS

APPROVED BY: DAM	PROJ. NO.: 128017	DATE: OCT 2007

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The stormwater management system will provide several benefits without significantly altering the dynamics of the watershed. One major benefit of the stormwater management plan is the positive water quality impacts. Pre development runoff flows to an unnamed tributary to Salt Creek in the form of sheet flow and shallow concentrated flow. During interim and final landfill conditions, stormwater will now pass through a series of terrace berms, perimeter ditches and detention basins prior to discharge, allowing sedimentation. Also, the basins will support aquatic vegetation, which will improve water quality.

TABLE 4-4(a)
DISCHARGE FOR THE 100-YEAR STORM EVENT (CFS) - INTERIM CONDITIONS

Location	**Duration**	
Scenario	**1-hour**	**24-hour**
Areas Draining to Sediment Basin B - Interim Conditions		
A	30.1	7.6
B	49.1	7.2
C	41.3	6.0
D	5.4	0.8
E	19.8	2.9
F	18.0	2.6
G	22.7	3.3
H	17.0	2.5
I	5.4	0.8
J	6.4	0.8
K	15.7	3.3
L	37.0	7.7
M	1.6	0.2
N	11.8	2.8
O	8.3	1.6

TABLE 4-4(b)
DISCHARGE FOR THE 100-YEAR STORM EVENT (CFS) - CLOSED CONDITIONS

Location	**Duration**	
Scenario	**1-hour**	**24-hour**
Sediment Basin A		
Subarea 5	45.8	11.3
Subarea 6	25.0	5.8
Subarea 7a	32.5	8.1

TABLE 4-4(b) DISCHARGE FOR THE 100-YEAR STORM EVENT (CFS) - CLOSED CONDITIONS		
Location	**Duration**	
Scenario	**1-hour**	**24-hour**
Subarea 7b	29.7	7.4
Subarea 7c	21.7	5.2
Subarea 9	43.5	10.6
Sediment Basin B		
Subarea 1a	39.3	9.8
Subarea 1b	25.6	6.3
Subarea 2	71.6	17.6
Subarea 3	17.1	3.6
Subarea 4	16.1	3.5
Subarea 14	16.6	3.9
Subarea 17	8.3	1.6
Sediment Basin C		
Subarea 10	45.4	10.7
Subarea 11	52.3	12.3
Subarea 12a	7.1	1.4
Subarea 12b	17.5	3.7
Subarea 13	27.0	5.9
Subarea 15	27.1	6.0

TABLE 4-5 DITCH DESIGN HYDROLOGIC RESULTS - CLOSED CONDITIONS					
Ditch/Berm Designation	**Drainage Area (ac)**	**Q_{100} (cfs)**	**V_{100} (ft/s)**	**d_{100} (ft)**	**D (ft)**
A	11.07	30.0	3.78	0.99	3
B	9.98	48.6	4.29	2.13	3
C	8.38	40.7	6.77	1.55	3
D/I	2.18	10.5	2.11	0.57	3
E/F	7.68	37.2	3.11	1.14	3
G	4.61	22.4	3.68	1.56	3
H	3.46	16.8	2.60	1.61	3

TABLE 4-5 DITCH DESIGN HYDROLOGIC RESULTS - CLOSED CONDITIONS					
Ditch/Berm Designation	Drainage Area (ac)	Q_{100} (cfs)	V_{100} (ft/s)	d_{100} (ft)	D (ft)
J	29.76	102.0	5.40	1.92	3
K	39.23	137.3	10.23	1.49	3
L	50.43	172.7	4.92	2.95	3
M	12.74	46.0	3.99	1.33	6.7
N	4.10	11.7	3.09	0.53	1.5

Notes:
1. Q_{100} - Peak discharge for 100 yr., 1-hour storm event from HEC-HMS
2. V_{100} - Flow velocity for 100 yr., 1-hour storm event
3. d_{100} - Depth for 100 yr., 24-hour storm event
4. D - Minimum design depth
5. The ditch is labeled according to the subarea that it drains.
6. Riprap, fabric formed concrete or erosion control materials (ECMs) will be utilized to prevent scouring and minimize erosion in ditches where critical velocity is greater than 5 ft/sec.

TABLE 4-6 STORMWATER BASIN HYDROLOGIC RESULTS							
Location	***100-Year Maximum Elevation (ft)***		***100-Year Maximum Inflow (cfs)***		***100-Year Maximum Outflow (cfs)***		***25-Year Maximum Outflow (cfs)***
	1-hour	***24-hour***	***1-hour***	***24-hour***	***1-hour***	***24-hour***	***24-hour***
Interim Conditions							
Sediment Basin B	662.9	670.7	184.5	49.6	0	17.7	0.0
Final Conditions							
Sediment Basin A	723.8	726.9	196.5	48.3	0.0	0.0	0.0
Sediment Basin B	662.9	670.7	184.5	49.6	0.0	17.7	0.0
Sediment Basin C	665.8	670.7	168.9	39.9	0.0	7.9	0.0

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Stormwater Controls During Cell Development

Runoff from all of the disturbed areas will be directed to the developed basins, temporary stormwater management structures, or will otherwise be properly controlled using best management practices prior to discharge. In addition, temporary berming and ditching may be incorporated to divert stormwater runoff from undeveloped areas.

During cell construction and filling, additional temporary measures will be incorporated to divert stormwater away from active landfilling and liner construction areas. Prior to the start of liner construction, diversion berms and drainage ditches will be developed to prevent runoff from impacting construction areas. These perimeter features will intercept the runoff from undisturbed areas before it reaches the construction areas (disturbed areas), and the runoff will be conveyed to the landfill perimeter as practical. Any stormwater that collects within the excavation will be routed to temporary stormwater collection sumps. Similarly, any rainfall which ponds on the liner and leachate collection system prior to the placement of waste will be pumped into the stormwater management system.

Once landfilling begins within a new cell, all stormwater which contacts waste or collects within the leachate collection system underlying landfilled waste will be treated as leachate, in accordance with the leachate management section of this application (Section 3). However, temporary diversion berms will be constructed around the active landfilling areas to the extent practical in order to divert stormwater from adjacent daily, intermediate and final cover slopes before it contacts any waste, thereby preventing the stormwater from coming into contact with waste. These temporary berms will divert stormwater runoff to the perimeter collection ditches or to below grade stormwater collection sumps located within the excavation. The temporary berms will complement the permanent perimeter trenches and berms which surround the active cell and prevent excavation side slope runoff from entering the active landfilling area.

Design Drawing No. D15 depicts the interim conditions of the landfill. A separation berm between the Chemical Waste Unit and the MSW unit will have a ditch to collect runoff from the areas sloping toward the separation berm. Water entering the ditch will be pumped into the perimeter ditches. During interim conditions terrace berms will be utilized on the areas sloping toward the separation berm to collect water from these areas and direct them to the perimeter ditches and therefore minimize the amount of water entering the ditch on the separation berm.

Final Grading

The final slopes are designed at a grade capable of supporting vegetation to minimize erosion. Overall, the final landfill slopes are designed to be no flatter than approximately 5 percent nor steeper than 25 percent. These slopes will drain runoff from the cover and prevent ponding. Vegetation shall be promoted on all reconstructed surfaces to minimize wind and water erosion of the final protective cover. In addition, terrace berms will be constructed approximately every 50 to 300 horizontal feet on the final landform to collect runoff and control erosion along the slopes of the landfill as shown on Design Drawing Nos. D15, D16 and D17.

Vegetative Soil Stabilization

A seed mixture of appropriate grasses will be incorporated into the upper surface of the protective soil layer. The mixture selected will be amenable to the soil quality/thickness, slopes and moisture/climatological conditions that exist without the need for continued maintenance and with minimal potential for root penetration into the underlying drainage layer.

Landscaping or seeding professionals knowledgeable of DeWitt County's soil and climatological conditions will be consulted in determining the specific seed mixtures, necessary soil amendments and application rates based upon specific seasonal conditions at the time of closure. As a guide, the design procedures and specifications presented in the handbook *Procedures and Standards for Urban Soil Erosion and Sediment Control in Illinois* will be utilized. Application rates for lime, fertilizer and any other necessary soil amendments shall be determined from composite soil tests from the area to be seeded. Mulch consisting of straw, jute, wood excelsior, etc. shall be used as necessary to hold the seed in place and conserve moisture. All finalized areas of the landfill will be seeded as soon as practical, with seeding usually conducted in the spring or fall.

Non-Vegetative Soil Stabilization

Aggregate cover will provide soil protection for both temporary waste haul roads and non-paved permanent roads. It may also be used at the outlets of storm drains where vegetation cannot adequately protect the soil from high water velocities. Aggregate shall be placed a minimum of three inches deep as soon as final grade or temporary grade is reached for the above mentioned areas.

Erosion and Sediment Control

In addition to the foregoing, the Clinton Landfill No. 3 will use erosion control techniques to minimize the generation of sediment in the runoff from disturbed areas. These techniques will not only minimize sediment erosion but will improve the water quality of the stormwater runoff from existing conditions. These will include, but not be limited to: 1) barrier filters, 2) vegetative filters, 3) terrace berming, 4) a settlement basin, and 5) energy dissipaters.

1. *Barrier Filters*. Barrier filters are intended to filter sediment from runoff and will be used for both sheet flow and channel flow. Barrier filters will be used at a minimum along the entire length of all disturbed slopes that are being directly discharged off-site until permanent vegetation has been established and sediment control is no longer necessary. Barrier filters will also be placed along all non-vegetated ditches perpendicular to the flow. When barriers are used along property lines or at the base of slopes, they shall be installed

parallel to the contours. When used around inlets, as much filter area as possible will be provided. For channel flow application, the barrier shall be extended to such a length that the ends of the barrier are higher in elevation than the top of the expected flows. Barrier filters may be made of straw bales, silt fencing, or other applicable devices. Rock check dams may be utilized within the perimeter ditches. Barrier filters will be routinely inspected in accordance with the stormwater pollution prevention plan and best management practices.

2. *Vegetative Filter*. Vegetative filters provide mechanical and biological filtration to improve water quality where concentrations of sediment are high and flow velocities are relatively low. Vegetative filters will be used along drainageways or property lines. Vegetative filters will also be used on the side slopes of the detention basin to filter sediment from overland flow.

3. *Terrace Berming*. Terrace berms will be constructed along the landfill side slopes to intercept sheet runoff and direct it into specially designed outlet ditches or letdown pipes. These lined outlet ditches will convey the runoff down the final sideslopes and into the perimeter ditches, thereby reducing the potential for erosion from sheet runoff. Details of the proposed terrace berms are located on Drawing No. D17.

4. *Sediment Basins*. Stormwater runoff from disturbed areas typically contains sediment. The sediment includes soil that erodes off of earth surfaces and aggregates that accumulate on paved surfaces. All stormwater runoff from the landfill will be directed to one of three sediment basins. These basins have been designed to remove sediment from the stormwater runoff.

5. *Energy Dissipaters*. At all points of concentrated flow (such as where there is a quick change in elevation or a change in material use), an energy dissipater, riprap, or other control will be used to prevent erosion and scouring.

Inspection and Maintenance

All temporary and permanent erosion control measures will be maintained and repaired as needed to assure continued performance of their intended function. This program will consist of performance checks of facilities and grades, remedial grading, sedimentation cleaning, vegetative care and maintenance. Inspections will address points of scour, slope failure, breaching or settling. Inspections will be performed once every 3 months and after significant storm events while the landfill is operating. Maintenance includes the watering of vegetation and clearing of sediment from barriers and the basins. Sediments will be dredged from the detention basins when the sedimentation level approaches the outlet structure perforations. Sediment removed from the barriers and the detention basins will not be placed in floodplain areas or in areas without adequate BMPs in-place. The sediment will be placed such that it will not be reintroduced into the drainage system. As necessary, runoff collection features will be cleaned, regraded, relined, rip-rapped, etc., to restore design capacities and correct problem areas. A written record of all inspections and maintenance will be prepared and placed in the facility Stormwater Pollution Prevention Plan (SWPPP), which will be kept at the site.

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All surface water control structures will be operated in perpetuity or until the regulatory agency determines that the facility poses no risk to human heath or the environment as outlined in the Closure and Post-Closure Care Plan (Section 9). Interim surface water control structures will operated as long as possible before construction progresses to that area.

Conclusion

The preceding section demonstrates that the Stormwater Management System has been designed and is proposed to be operated in a manner that protects the public health, safety and welfare. The discharge rates will be controlled to facilitate sedimentation and prevent flooding, and will not alter the drainage conditions of off-site areas located upstream or downstream of the facility. All stormwater will be controlled to prevent contact with waste, and any stormwater which contacts waste will be contained and treated as leachate.

The stormwater management system has been design to exceed all local, state and federal regulations. The post-development release rates will be less than existing release rates, thereby reducing flooding potential of areas downstream of the proposed landfill. Additionally, the post-development water quality will improve over existing water quality through the use of barrier and vegetative filters, and settlement basins.