

CLOSURE / POST CLOSURE PLAN

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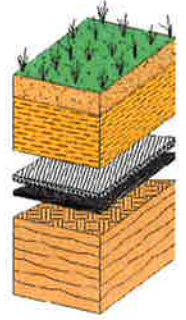
FOR

ENVIRONMENTAL WASTE SOLUTIONS



CLASS II INDUSTRIAL WASTE LANDFILL

200 Omar Circle,
Camden, Tennessee 38320



PREPARED

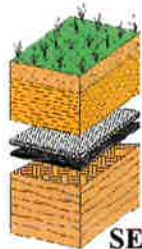
BY



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March 2011
Revised December 2011
March 2015 Revision





ENVIRONMENTAL WASTE SOLUTIONS CLOSURE / POST CLOSURE PLAN



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I. INTRODUCTION

A. Purpose of the Closure and Post Closure Plan

Rule 0400-11-01-.04(9)(d) *The Part II permit application must include a closure/post-closure plan described in Rule 1200-1.03(2)*

The following Closure and Post-Closure Care (C/PC) Plan was previously modified to reflect an expansion and reclassification of the Custom Tire and Recycle Company (CTR) Landfill from a Class IV landfill to a Class II landfill. The C/PC Plan has been submitted in accordance with the Tennessee Division of Solid Waste Management (TDSWM), Rule 0400-11-01-.03(2). This plan is a revision of the existing C/PC Plan which was submitted in January 2008 as a Major Permit Modification. This C/PC Plan revision specifically addresses closure and post-closure activities for the proposed liner/leachate collection modification to the permitted Class II Landfill facility which is now owned and operated by Environmental Waste Solutions (EWS). A discussion of the closure and post-closure care is included to provide the TDSWM the information necessary to provide closure and post-closure care under the current landfill regulations adopted by the TDSWM.

Information within the C/PC Plan has been correlated to the permit requirements provided in the TDSWM regulations. Sections within this report are titled with respect to the regulations to aid in the review process. All related materials, maps, previous reports, letter, etc., have been supplied within the various appendices of this permit application.

The C/PC Plan is one of several documents required as part of a landfill permit. The documents and accompanying design drawings are provided to satisfy the requirements of the Environmental Protection Agency (EPA) Subtitle D regulations adopted by the Tennessee Department of Environment and Conservation's Division of Solid Waste Management (TDSWM).

Based upon the TDSWM landfill regulations the permit for the EWS Class II Landfill includes the following documents, design drawings, and design calculations as follows:

DOCUMENTS

Document I	Operations Manual
Document II	Closure/Post-Closure & Construction Quality Assurance Plans
Document III	Hydrogeological Investigation Reports
Document IV	Groundwater Monitoring Plan
Document V	Construction Quality Assurance Plan

ATTACHMENTS

Attachment I	Permit Drawings
Attachment II	Design Calculations
Attachment III	Permit Correspondence

The accompanying engineering plans entitled "EWS Class II Landfill", Dated June 2011, depict the design of the facility as required by Rule 0400-11-01-.04(9)(b).

B. General Information

As previously described the site of the Class II landfill is located at 200 Omar Circle in Camden, Benton County, Tennessee. The site was originally permitted as a Class IV Landfill under TDSWM Permit Number DML 03-0108.



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The type wastes to be disposed of in the permitted landfill facility are limited to Class II solid waste materials as defined in Rule 0400-11-01-.01(3).

Topographic maps generated from site surveys and on-site observations indicate that ground surface elevations within the proposed landfill extension, range from a maximum of approximately 469 feet above Mean Sea Level (MSL) in the north central quadrant of the proposed landfill extension area to an elevation approximating 376 feet above MSL at the southeastern tip of the proposed extension.

The original design drawings indicate that the landfill is permitted to extend to elevation 490 feet MSL. This extension will maintain the top of the waste fill at an elevation approximating 568 feet MSL. The location of the facility is depicted in **Figure 1** which may be viewed in **Appendix I – Maps**.

II. CLOSURE/POST CLOSURE PLAN REQUIREMENTS AND ACTIVITIES

A. Contents of the Plan

Rule 0400-11-01.03(2)(b) Contents of Plan

1. *The closure/post-closure plan must identify the steps necessary to completely or partially close the facility at any point during its intended operating life and to completely close the facility at the end of its intended operating life, and must identify the activities which will be carried on after closure and the frequency of these activities. For facilities being developed according to a phased development plan, the closure/post-closure plan must address each parcel separately as well as the whole.*

The following subsections of this C/PC plan present a detailed description of the steps necessary to partially and completely close each section of the proposed extension.

2. *The closure/post closure plan must include, at a minimum:*
 - (i) *A description of how and when the facility will be partially closed, if applicable, and finally closed. The description must identify how the applicable closure standards of Rule 0400-11-01-.04(8) will be met. It must also include an estimate of the expected year of closure and a schedule for completing the final steps of final closure;*

Subsection II.B.2 of this document contains a table outlining the steps that will be followed during closure of the facility. Subsection II.B and II.C of this C/PC plan list the requirements of paragraph (8) and identify facility specific methods for meeting these requirements.

It is estimated that the first area of the landfill to be developed is a 4.87 acre cell within the southern section of the Phase 2 footprint. This section should provide five years of disposal capacity. Closure of the facility at this stage of operation would entail covering approximately 7.5 acres with a final cover system illustrated on **Sheet 10** of the **Permit Drawings** which accompany this document.

- (ii) *A description of the planned ground and surface water monitoring and other monitoring and maintenance activities and frequencies at which they will be performed. The description must identify how the applicable post-closure care standards of Rule 0400-11-01-.04(8) and the applicable Ground Water Protection/Monitoring Standards of Rule 0400-11-01-.04(7) will be met.*



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The **Groundwater Monitoring Plan (GMP)** has included as **Document IV** in the EWS Class II Landfill permit application. The **GMP** has been designed to establish a step-by-step procedure for determining impact on groundwater and surface water quality during the active life and for the post-closure care period of the facility.

- (iii) *The name address, and phone number of the person or office to contact about the facility during the post-closure care period. This person or office must keep an updated closure/post-closure plan during the closure/post-closure care period.*

Mr. Chris White President
Environmental Waste Solutions, LLC
4521 Trousdale Drive,
Nashville, Tennessee 37204

- (iv) *An itemized estimate of the cost based on hiring a third party to perform the closure and post-closure care activities. Inflation shall be factored into this estimate and the estimated annual inflation rates used shall be included.*

Appendix II of this document contains the itemized cost estimates prepared for the proposed extension.

- (v) *A description of the planned uses of the property during the post-closure care period.*

A subsequent section describes the monitoring/maintenance activities to be performed during the post-closure care period specified as a permit condition. At present there are no specific planned uses for the site during this period.

B. Amendment of the Plan

Rule 0400-11-01.03(2)(c) Amendment of Plan – The approved closure/post-closure care plan may be amended at any time during the active life of the facility or during the post-closure care period as set forth in this subparagraph.

1. *The operator may request to amend the plan to alter the closure requirements, to alter the post-closure care requirements, or to extend or reduce the post-closure care period based on cause. The request must include evidence demonstrating to the satisfaction of the Commissioner that:*
 - (i) *The nature of the facility makes the closure or post-closure care requirement(s) unnecessary; or*
 - (ii) *The nature of the facility supports reduction of the post-closure care period; or*
 - (iii) *The requested extension in the post-closure care period or alteration of closure or post-closure care requirements is necessary to prevent threats to human health and the environment.*

Chart One provides a general procedure for amending the Closure/Post Closure care plan during the post-closure care period. Specifically, modifications to the frequency of monitoring and the length of the post closure care period. Detailed procedures for performing an evaluation of the condition of the landfill during the post-closure care period with respect to potential impact to human health and the environment will be provided in latter sections of this document.



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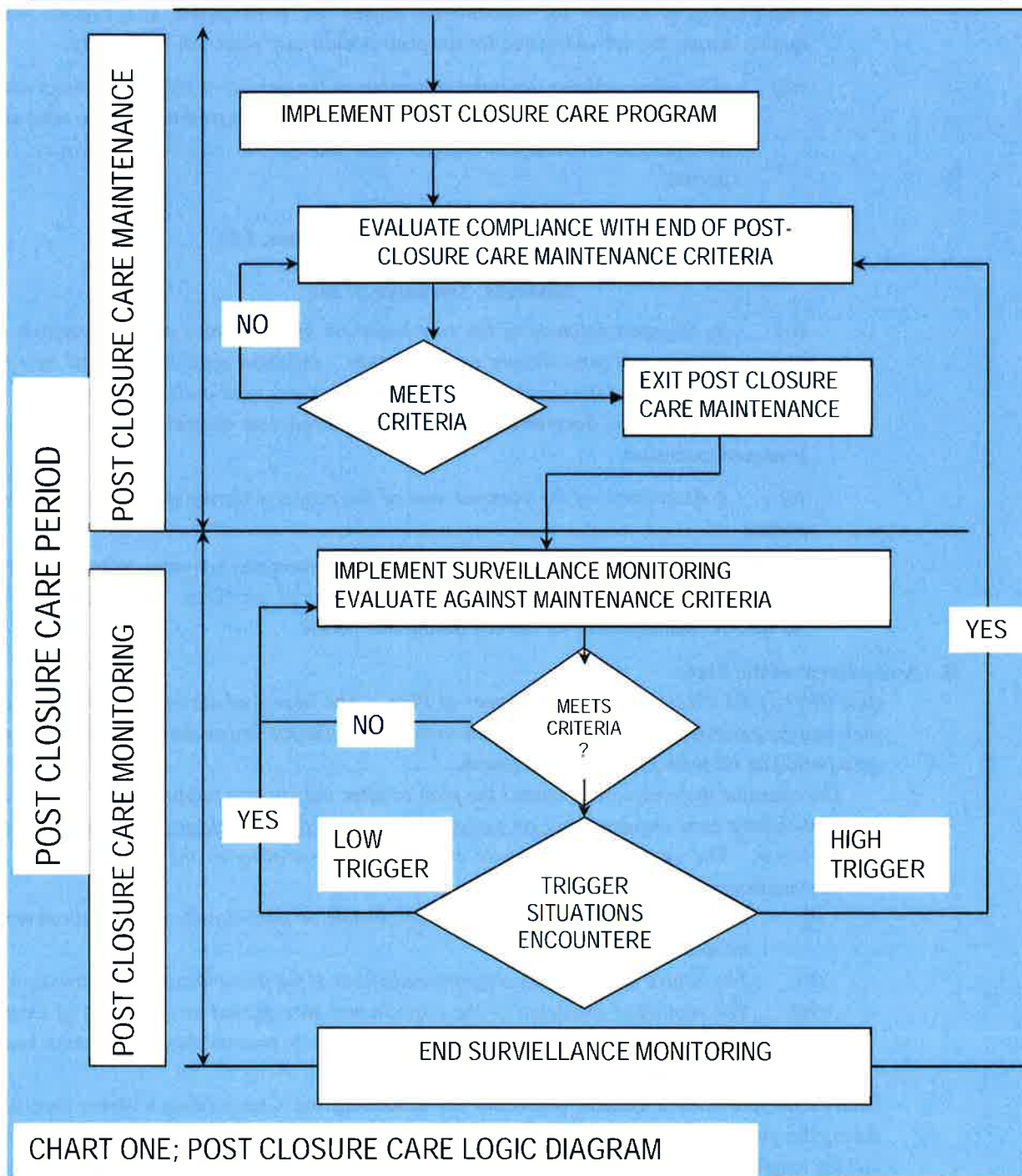
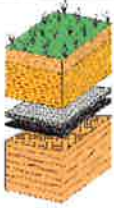


CHART ONE; POST CLOSURE CARE LOGIC DIAGRAM



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C. Closure Requirements

Rule 0400-11-01.04(8) Closure and Post-Closure Standards – Unless specifically noted otherwise, the standards of this paragraph apply to Class I, Class II, Class III, and Class IV disposal facilities.

(a) General Performance Standard

- 1. The operator must close the disposal facility or disposal facility parcel in a manner that:
 - (i) Minimizes the need for further maintenance; and*
 - (ii) Controls, minimizes, or eliminates, to the extent necessary to prevent threats to public health and the environment, post-closure escape of solid waste, solid waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.**

This C/PC Plan provides direction to close the disposal facility in a manner that will minimize the need for further maintenance to the facility. In addition, the plan specifies measures to control, minimize, or eliminate, to the extent necessary threats to public health and the environment.

- 2. The operator must care for a disposal facility or disposal facility parcel for the period of time after closure, specified in subparagraph (d) of this Rule, in a manner that assures that the performance objectives of part 1 of this subparagraph are continuously met.*

The operator will provide post-closure monitoring/surveillance for the disposal facility in accordance with this C/PC Plan for the number of years the TDSWM specifies in the permit after the date of final closure of the facility.

(b) Adherence to Plan – The operator must initiate and complete closure activities and conduct post-closure care activities in accordance with the approved closure/post-closure care plan, if such plan has been prepared and approved for the disposal facility or disposal facility parcel being closed.

At the time of facility closure, the operator will initiate and complete closure activities and conduct post-closure care activities in accordance with this closure/post-closure care plan as approved.

(c) Closure Requirements – The following requirements apply to active portions of the facility:

- 1. The operator must notify the Division Director of his intent to close at least 60 days prior to the date he expects to begin final closure of the disposal facility or disposal facility parcel.*
- 2. The operator must complete closure activities including grading and establishing vegetative cover in the shortest practicable time, not to exceed 180 days, after any fill areas or any portion of the fill area have achieved final grade.*

The facility operator will submit a written notification to the TDSWM of its plans to close the



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facility at least 60 days prior to closure. The steps that will be followed during closure of the facility will proceed as outlined in the following table.

Table 1 - Steps for Final Landfill Closure

Closure Activities	Day
Notify TDSWM of intent to close landfill Facility	1
Close Landfill	61
Remove unnecessary on-site structures, place erosion control measures, and begin to grade and proof roll area to be capped	61
Complete Low Permeability Cover	120
Complete Placement of Topsoil and begin final sediment control procedures	150
Complete Vegetative Layer, provide notation on deed that property was used as a disposal facility, and initiate final notification of closure to TDSWM	240

3. *Unless otherwise noted in the permit a depth of compacted final cover material (e.g., soil) shall be placed on the disposal facility or disposal facility parcel in the shortest practicable time, not to exceed 90 days, after achieving final grade of any fill area or any portion of a fill area. At least the top twelve inches of this cover material shall be soil which will support the growth of suitable vegetation (e.g., topsoil).*

(i) *At Class I and Class II facilities the depth of final cover shall be at least 36 inches of soil of which a minimum of 12 inches shall be for the support of vegetative cover.*

The design of the final cover system shall be such that the infiltration volume of water will be equal to or less than the percolation volume through the bottom liner system or permeability no greater than 1×10^{-7} cm/sec, whichever is less. The design shall be supported by the use of the HELP model or other equivalent method approved by the commissioner.

An alternate final cover system may be used provided that it is demonstrated to the satisfaction of the Commissioner that the final cover system provides equivalent or superior performance to the minimum performance standard in this support.

(ii) *At Class I, II, III, and IV facilities, with approval of the Commissioner any other low permeability layer construction techniques or materials may be used to provide the final cover, provided that it provides equivalent or superior performance to the requirements of this part.*

Although the Class II regulations provide a mechanism to provide industries with some flexibility in managing their own specific waste streams EWS has developed some alternate final cover designs which will comply with the most stringent performance standards detailed in Rule 0400-11-01-.04(8)(c)3. detailed in the previous paragraphs. The following paragraphs address the potential waste streams which may be disposed of in the Class II landfill.



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Coal Combustion By-Product Waste Final Cover Requirements

The following paragraphs are taken from TDSWM Rule 0400-11-01-.02 (c) 1. (ii) (V), and (IX) which are specific to the closure requirements for coal combustion by-product (CCB) wastes. An explanation of the manner in which each of the following coal requirements specific to closure of CCB fills is provided below each requirement.

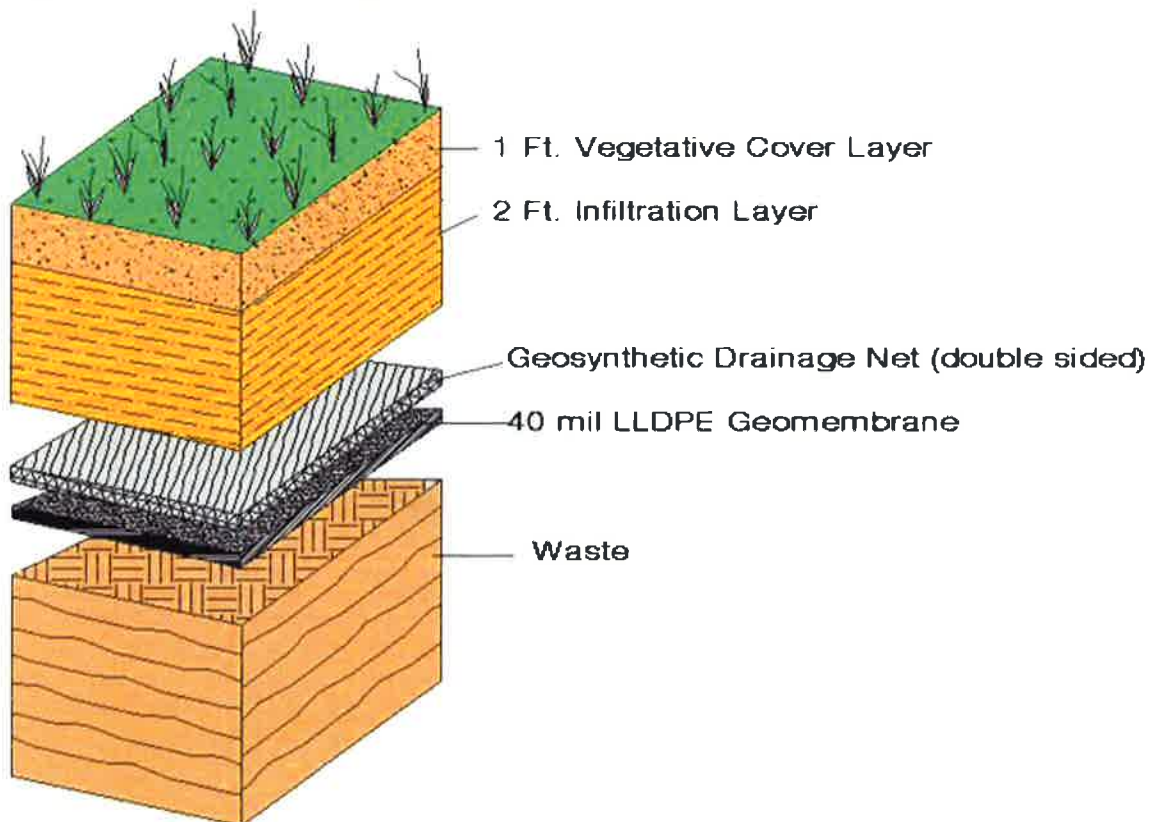
(V) *The fill area is constructed, operated, maintained, and closed in such a manner as to minimize:*

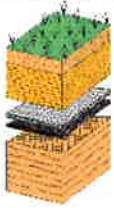
I. *The potential for harmful release of solid wastes or solid waste constituents to the environment; and*

(IX) *At the completion of the coal-ash fill project, and no later than 90 days after operations have ceased, the final cover must meet the requirement of at least 24 inches of compacted soil on the coal-ash project area, except for those areas covered by structures, asphalt, concrete (including concrete containing coal ash), or other similar barriers to water infiltration. The upper six inches of this cover shall be able to support the growth of suitable vegetation.*

The final cover system proposed for this facility that satisfies the minimum requirements for CCB waste fills is provided as **Drawing 1 Typical Section - Industrial Waste Final Cover** in this document.

Figure 1 - Industrial Waste Typical Final Cover Section





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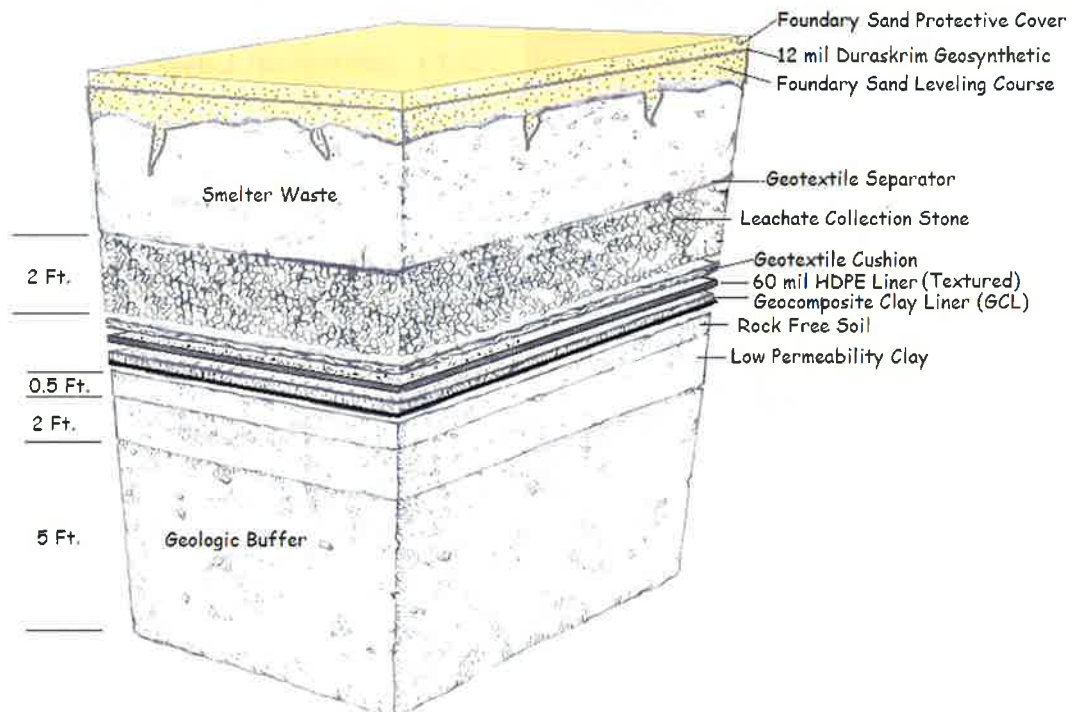
Secondary Aluminum Smelter Waste Final Cover Requirements

EWS has also developed a final cover system that exceeds the minimum requirements for landfills permitted to dispose of Class I municipal solid wastes as well as Class II industrial waste materials generated from Secondary Aluminum Smelters (SAS). A detail of a typical final cover system proposed for closure of the SAS Waste Phases is illustrated in **Figure 2 and Figure 3**. An enhanced geosynthetic cover system designed specifically to inhibit the generation and off-site migration of landfill gas vapors will be installed over the portion of the landfill footprint with gas generation potential. EWS has completed construction of the final cover system for the east and south slopes of Phase 2 Cell 1. Final cover construction over SAS waste phases may be performed in two stages as described in the following paragraphs.

EWS has recently incorporated the use of a 12 mil scrim reinforced geosynthetic material as a standard component of the daily and intermediate cover at the EWS Class II Landfill to inhibit and/or eliminate the release of ammonia vapors generated from the reaction of SAS waste materials with water. The initial stage of construction of the final cover system includes placement of the 12 mil scrim reinforced geosynthetic material as illustrated in **Figure 2**. The second stage of the final cover system construction will be initiated after the landfill gas collection and management system is installed and functioning as designed. The purpose of staging the final cover construction provides EWS to the flexibility to modify and maximize the collection and treatment efficiency of the LFG system without compromising the integrity of the Stage 2 Final Cover Layers.

Figure 2 and Figure 3 illustrate the specific daily cover and interim cover components that may be installed at the EWS Landfill.

Figure 2 - Foundry Sand / DuraSkrim Daily Cover Section





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Interim Cover Scrim Reinforced Geomembrane Installation Specifics

Tires will be employed to ballast and protect the 12 mil geomembrane from wind action. The tires will be tied together with rope and anchored with a steel rebar driven in the soil cover prior. The rebar will be driven prior to placement of the geomembrane cover.

Figure 3 - Typical Interim Cover Section for SAS Waste Phases

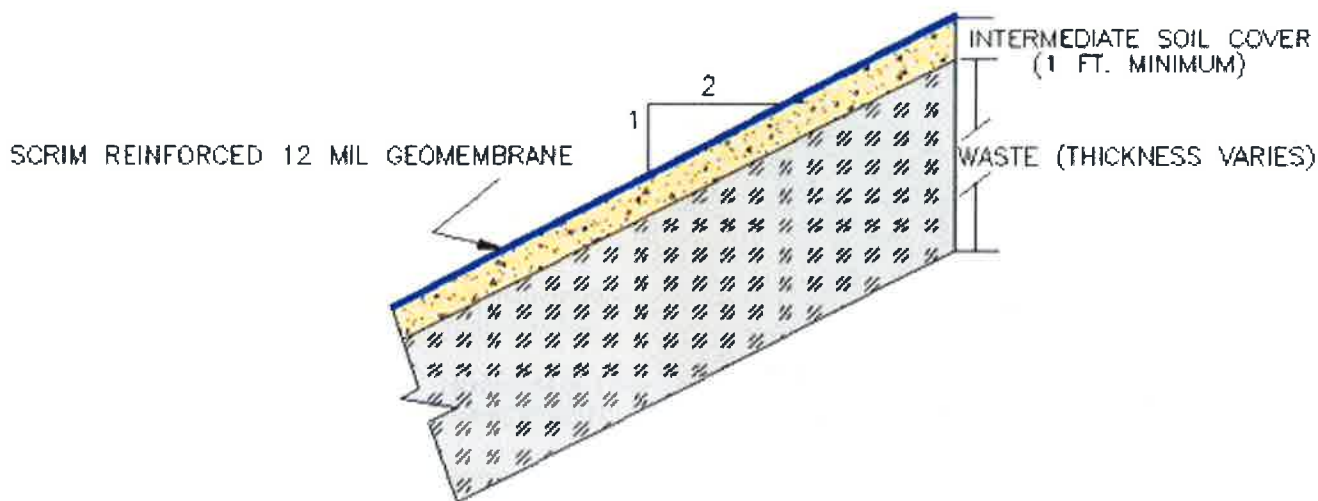
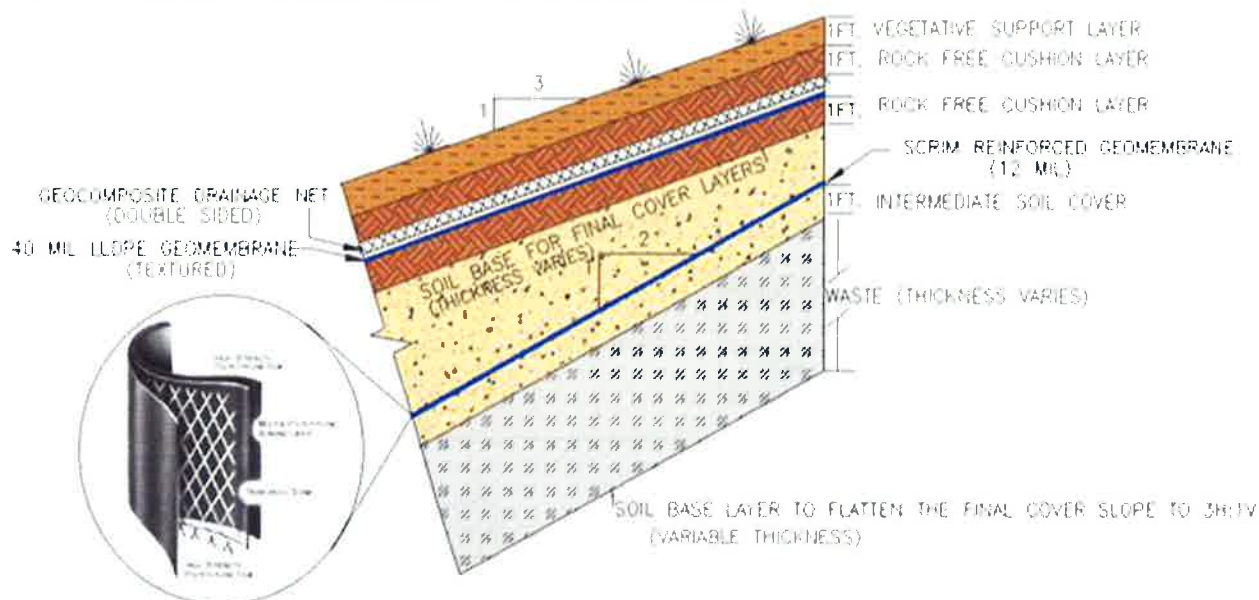


Figure 4 illustrates a typical final cover configuration for industrial wastes at the EWS Class II Landfill.

Figure 4 - Typical Final Cover Section for SAS Waste Phases



It should be noted that EWS completed construction of the final cover system for approximately 1.87 acres of the east and south slopes of Phase 2 Cell 1 on October 28, 2012 using an alternate cover system. The alternate final cover system used to construct the final cover over approximately 1.87 acres of the east and south slopes of Phase 2 Cell 1 which consisted of the use of the propriety product referred to as



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Closure Turf™. Figure 5 illustrates a section of the Closure Turf™ final cover system used to close the east and south slopes of Phase 2 Cell 1. Phase 2 Cell 1 is comprised solely of SAS waste materials.

Figure 5 - Alternate Final Cover Sections

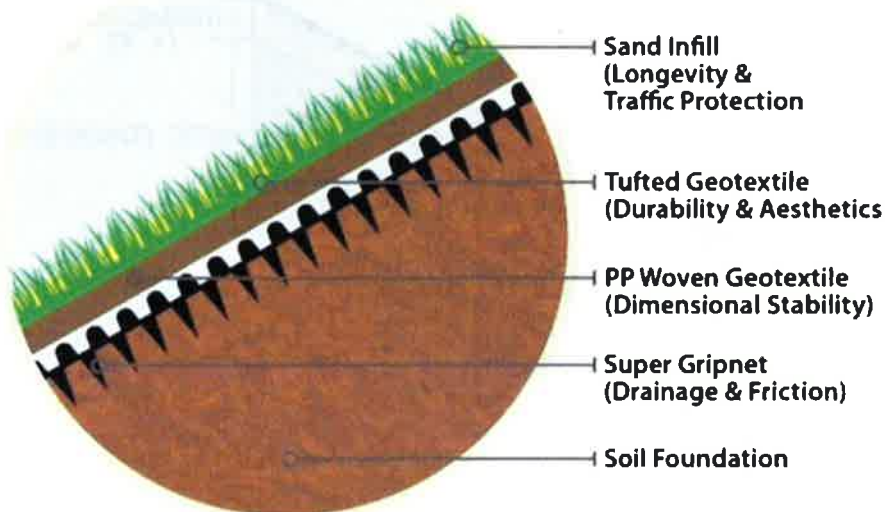
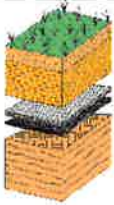


Table 2- Final Cover System Alternate Designs

Final Cover Components	Proposed TDSWM Regulatory Compliant Alternate Final Cover Sections			
	Phase Designation Specific to Alternate Final Cover Sections			
	Industrial Waste Phase 4 (Alternate 1)	Industrial Waste Phase 4 (Alternate 2)	Secondary Smelter Waste Phases 1,2,3 (Alternate 1)	Secondary Smelter Waste Phases 1,2,3 (Alternate 2)
Vegetative Support Layer	1.0 Ft. Vegetative Support	Closure Turf	1.0 Ft. Vegetative Support	Closure Turf
Low Permeability Soil Layer	2.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)		1.0 Ft. Soil Infiltration Layer (6" Rock Free Soil Above Geosynthetics)	
Geocomposite Drainage Net	Double Sided Geocomposite	NA	Double Sided Geocomposite	NA
Flexible Membrane Liner	40 mil LLDPE textured	50 mil Super Grip Net	40 mil LLDPE textured	50 mil Super Grip Net
Base Layer for Geosynthetics	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)	1 Ft. Intermediate Cover (6" Rock Free Soil at Geosynthetic Interface)



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4. *The final surface of the disposal facility or disposal facility parcel shall be graded and/or provided with drainage facilities in a manner that:*
 - (i) *Minimizes precipitation run-on from adjacent areas onto the disposal facility parcel;*
 - (ii) *Minimizes erosion of cover material (e.g., no steep slopes);*
 - (iii) *Optimizes drainage of precipitation falling on the disposal facility or disposal facility parcel (e.g., prevent pooling); and*
 - (iv) *Provides a surface drainage system which is consistent with the surrounding area and in no way significantly adversely affects proper drainage from these adjacent lands.*

Drainage structures have been designed to minimize surface water run-on from areas adjacent to the disposal facility by channeling the surface water away from the disposal facility.

Erosion of soil material on the final cover system will be minimized through slope stabilization techniques. The final cover slopes will not exceed a 3H:1V slope. The cover system design optimizes drainage and precipitation run-off through minimum top slopes of 5% to prevent ponding on the cap. The surface drainage system has been designed to be consistent with the surrounding area and in no way significantly affects proper drainage from or to adjacent lands.

The maximum length of the steepest slope between tack-on benches ranges between 90 and 120 feet. Vegetation will be established on the cover system surface as the fill progresses for sections which will not incorporate the use of the Closure Turf™ final cover section. Temporary erosion control blankets will be used if necessary to provide seedbed protection and prevent the wash-out of seed and fertilizer during vegetation establishment. As the final cover system will be stabilized with vegetation and terraced by means of the tack-on benches, the development of gullies and rills is not expected on the final cover system.

Drainage structures designed on the site include existing stormwater conveyance channels, perimeter channels, culverts, and sediment ponds. Drainage structures have been designed to accommodate at least a 24-hour, 25 year storm. A discussion of the design for the drainage structures is included in **Section 14** of the **Operations Manual**.

The operator will be responsible for any additional erosion control measures, as needed, such as the installation of additional erosion control blankets, straw bales, silt fencing, straw wattles, or rip-rap. Any areas which will be unused for more than 30 days will be seeded to prevent erosion.

Borrow areas will be stabilized within 30 days of ceasing borrow activities through the establishment of vegetation. All borrow and stockpile areas will be graded to allow positive drainage off-site. In the case of severe slopes the borrow area shall be graded to a 3:1 slope and then seeded. Additional erosional problems will be addressed with appropriate structural or non-structural sediment and erosion control practices as prescribed within the plans or in the most recent edition of the Tennessee Erosion and Sediment Control Handbook.

5. *In order to minimize soil erosion, as soon as practicable after final grading, the operator shall take steps as necessary to establish a protective vegetative cover of acceptable grasses over disturbed areas of the site. These steps shall include seeding, mulching, and any necessary fertilization at a minimum, and may*



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include additional activities such as sodding of steeper slopes and drainage ways if such are necessary

In order to minimize soil erosion, as soon as practical after final grading, the operator shall take steps necessary to establish a protective vegetative cover of acceptable grasses over disturbed areas of the site. These steps shall include seeding, mulching, and any necessary fertilization, at a minimum, and may include additional activities such as sodding of steeper slopes and drainage ways if necessary. The recommended type of seed mixtures are included in **Section 14** entitled **“Run-On, Run-Off, and Erosion Control”** of **Document I “Operations Manual”**.

6. *In addition to the drainage and grading requirements and vegetative cover requirements, the operator shall take other measures as may be necessary to minimize and control erosion and sedimentation (e.g., soil stabilization, sediment ponds) at the site.*

Presently a portion of one of the two permitted sediment basins at the site has been constructed. Each of the basins has been designed to accommodate at least a 24-hour, 25 year storm. Additional erosional problems will be addressed with appropriate structural or non-structural sediment and erosion control practices as prescribed within the plans or the most recent edition of the Tennessee Erosion and Sediment Control Handbook.

7. *As required in his permit, or as otherwise necessary to prevent threats to human health and the environment, the operator shall establish and/or complete a system for collecting, removing, and treating leachate generated by the disposal facility or disposal facility parcel.*

Leachate collection sumps have been designed to collect leachate from each of the four phases at the ES Class I landfill. The design of the LCS pipe sizes and spacing is based upon the regulatory requirement to maintain less than one foot of leachate head above the composite liner. Hydraulic analyses were performed using the HELP computer model developed by the Corps of Engineers (COE) to determine the pipe diameter and pipe spacing required to comply with the maximum of one foot of leachate above the liner requirement.

A force main pipe system has been designed to convey collected leachate to the leachate tank farm. The force main, which is constructed of HDPE pipe with a DR of 11, has been equipped with lift stations situated at critical locations to ensure proper conveyance to the leachate tank farm. The required nominal pipe diameter required for the force main system has been designed at 2 inches. It should also be noted that exposed piping has been insulated to inhibit freezing.

The existing leachate storage tank and any additional tanks is and will be glass-fused-to-steel or stainless steel (or equal) for protection against corrosion and all tanks will be situated inside a secondary containment area consisting of another larger diameter tank. The leachate storage tank facility has been sized to allow up to two leachate tanks to provide 30 days of storage for an average leachate generation rate of 2,150 gallons/day. This estimate of tank storage capacity is based upon empirically based calculations which may not be representative of actual leachate generation rates. Therefore, as the site is developed “actual leachate generation rates” will be evaluated and the number of tanks will be installed according to actual quantities of leachate generated. However, initially, one tank has been constructed along with a secondary containment tank. The initial tank has a total capacity of approximately 100,000 gallons. The



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current tank is 28 feet in diameter with a 24.5 foot sidewall. The tank also has a glass fused to steel roof. The secondary containment tank has a capacity of at least 110,000 gallons (or 110% of the total capacity of any one of the main storage tanks when accounting for volume occupied by non-leaking tanks).

The City of Bruceton and Jackson, Tennessee are presently providing disposal for the leachate generated on-site. In the event that either of these leachate management options becomes inaccessible EWS will secure all applicable permits and minor modifications of the permit from the TDSWM prior to disposal.

8. *As required in his permit, or as otherwise necessary to prevent threats to human health and the environment, the operator shall establish and/or complete a system for collecting and venting or otherwise controlling the vertical and horizontal escape of gases generated in the disposal facility or disposal facility parcel.*

A landfill gas collection (LFG) and removal system has been designed and partially installed for this facility. The LFG system has been designed based upon the results of bench scale testing and a review of all available technical documents relative to the SAS waste generation of gas. The LFG system has been designed to accommodate between 5 and 200 standard cubic feet per minute. The LFG system will be modified as conditions warrant.

A treatment system has been designed that will convert the landfill gas to the liquid ammonium sulfate based upon available data. This system will also have to be modified as necessary to ensure the LFG is properly managed and controlled.

9. *The operator must notify the Division Director in writing of his completion of closure of the disposal facility parcel. Such notification must include a certification by the operator that the disposal facility or disposal facility parcel has been closed in accordance with the approved closure/post-closure care plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved plan. Within 10 days such verification, the Commissioner shall approve the closure in writing to the operator. Closure shall not be considered final and complete until such approval has been made.*

EWS will notify the Division Director in writing of completion of closure of the disposal facility or disposal facility parcel. Such notification will include a certification by the operator that the disposal facility or disposal facility parcel has been closed in accordance with the approved closure/post-closure plan.

(d) Post-Closure Care Period – For Class I and Class II disposal facilities, post-closure care must continue for 30 years after the date of final completion of closure of the disposal facility or disposal facility or parcel unless a shorter period is established in the approved Closure/Post-Closure care plan. For Class III and IV disposal facilities, post-closure care must continue for 2 years after the date of final completion of closure of the facility or facility parcel. The post-closure care period may be reduced or extended based on cause by amendment of the approved closure/post-closure care plan as provided in Rule 0400-11-01-.03(2)(e).



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Presently, the EWS Class II Landfill is required to provide for post-closure care for a period of thirty years after completion of final closure activities. However, the length of the post closure care period will be evaluated and modified as per **Chart One** of this document. The following paragraphs provide a detailed explanation of procedures that will be followed to evaluate and control potential impacts of the facility to human health and the environment. The installed groundwater wells will provide a system to help determine the actual period for post closure care.

D. Post-Closure Care Activities

The following pages provide a detailed explanation of the Post Closure Activities planned for the EWS Class II Landfill. The intent of the Post Closure Care Period is to maintain the final cover and geologic buffer barrier layers to prevent impacts to groundwater. The strategy to maintain the constructed barriers at the EWS Class II Landfill is detailed in the following sections.

The long term management strategy provides an explanation of the maintenance and monitoring of the following landfill systems:

- Final Cover System (FCS)
- Leachate Collection and Removal System (LCRS)
- Landfill Gas Collection and Monitoring System (LFGS)
- Groundwater Monitoring System (GWMS)
- Institutional Controls (Site Access)

FINAL COVER SYSTEM POST CLOSURE CARE ACTIVITIES

TDSWM Regulation Specific to Post Closure Care Activities is as follows:

Rule 1200-7-.04(8)(e) Post Closure Care Activities – During the post-closure care period, the operator must, at a minimum, perform the following activities on closed portions of his facility:

- 1. Maintain the approved final contours and drainage system of the site such that the objectives of part (c)4 of this paragraph are continuously met;*

The approved final contours and drainage system will be maintained at the site. If re-grading is required due to settlement or other structural problems with the final cover system, the problem area will be stripped of the vegetation layer, and fill dirt will be applied to the area. The disturbed area will be recovered with topsoil and seeded as specified in the design and covered with new erosion control matting. All drainage ditching will be inspected at least once a month. Any landfilled areas with excessive surface cracks in the soil cover will be corrected to prevent infiltration of surface water. The cracks will be properly graded with suitable soil and appropriate vegetative cover will be established. Maintenance of the final cover system will be performed while also ensuring that the integrity of the cover system is not compromised. In the event the final cover system is damaged, it will be repaired in a timely manner.

- 2. Ensure that a healthy vegetative cover is established and maintained over the site;*

The vegetative cover will be inspected on a monthly basis so as to maintain a healthy stand of vegetation. Areas containing distressed vegetation will be reseeded as necessary.



EWS CLASS II LANDFILL CLOSURE / POST CLOSURE PLAN



3. *Maintain the drainage facilities, sediment ponds, and other erosion/sedimentation control measures (if such are present at the landfill), at least until the vegetative cover is established sufficiently enough to render such maintenance unnecessary;*

All sediment control structures and other erosion/sedimentation control facilities will be maintained on an as-required basis until the vegetative cover is sufficiently established to render such maintenance unnecessary.

Storm water conveyance channels will be constructed and lined to prevent erosion. The channels should be inspected monthly and after every major storm event for structure and erosion problems. Sediment will be removed from the channel and the channel inspected for damage. If damage to the channel is discovered, it will be repaired as appropriated.

LEACHATE COLLECTION SYSTEM POST CLOSURE ACTIVITIES

4. *Maintain and monitor the leachate collection, removal, and treatment system (LCRS) (if such is present at the facility);*

The LCRS at the EWS Landfill has been designed to contain and remove leachate from the landfill so that the depth of leachate over the composite liner system does not exceed one foot. The LCRS was designed for the worst case scenario which is during the operating life of the landfill.

It is recommended that LCRS be inspected on a semi-annual basis during the post-closure care period. All LCRS pumps, valves, control panels, leachate tanks and pump stations will be inspected at a minimum of every six months. However, the site may be equipped with an electronic system to notify the owner of pump malfunction and shutdown.

It is recommended that the inspection and cleaning of the leachate collection piping be conducted a minimum of once every 3 years initially during the post closure care period, when leachate levels in the system are low. Although leachate flows are continuous year round, the rates are lowest in late summer or early fall and this is the preferred time of year to clean the system. Although it is presently recommended to inspect and clean the leachate collection piping at least once every 3 years, the stress on cleaning the leachate collection system may change if the leachate quality changes over time. This cleaning frequency should be governed by the extent of encrustation and sediment buildup observed during each inspection event and, therefore, may be subject to change. The frequency of cleaning should be reviewed and discussed in each semi-annual report.

It is recommended that the inspection and cleaning of the LCRS be coordinated with maintenance of the leachate holding tank, and the semi-annual inspections of the various pumps and valving in the leachate collection system. The cleaning event will inevitable flush some sediments through the header pipes and into the pump station manhole. Pump inspections and maintenance would be best to follow the cleaning event for the reason noted above.

Numerous studies performed on leachate generation at closed landfills have been compiled by the Environmental Protection Agency (EPA) in the document titled "Assessment and Recommendations for Improving the Performance of Waste Containment Systems", EPA/600/R-02/099. Analysis of the data generated from the studies that are compiled and presented in the aforementioned document revealed negligible flow rates after the landfills had been closed for nine years.



EWS CLASS II LANDFILL CLOSURE / POST CLOSURE PLAN



LANDFILL GAS CONTROL SYSTEM POST CLOSURE CARE ACTIVITIES

5. *Maintain and monitor the gas collection and control system (if such is present at the facility).*

Rule 0400-11-01.04(5) Gas Migration Control Standards

- (b) *Class II and Class III Disposal Facilities must meet the standards for Class I disposal facilities in subparagraph (a) of this paragraph unless the operator demonstrates to the satisfaction of the Commissioner that due to nature of his solid wastes or operation no significant amounts of gas will be generated within his facility.*

The Landfill Gas Collection and Control System (LFGS) will be monitored during the post-closure care period for maintenance issues. The basic LFGS generally includes at a minimum LFG wells, collection piping, condensate piping and knockouts, blowers, and flares. The conditions that present LFGS maintenance issues which will be monitored and evaluated are listed as follows:

- a. Unusual settlement or subsidence,
- b. Signs of subsurface fires,
- c. Cracks and fissures,
- d. Liquids ponding on the cover,
- e. Condensate/leachate weeping from side slopes,
- f. Surface emissions and hot spots, and
- g. Liquid surging and blockage of the LFGS.

The actual frequency for monitoring the LFGS will vary depending upon site specific field requirements and conditions. Normal monitoring frequency for a complete field monitoring session with full field readings will typically vary from once a month to twice a week. *It should be noted that once the active LFGS system is installed a Landfill Gas Collection and Control System (GCCS) Plan and a Startup, Shutdown and Malfunction (SSM) Plan will be prepared as is required by the New Source Performance Standards (NSPS) regulations. The SSM Plan will provide specific detail regarding the maintenance of the LFGS.*

Rule 0400-11-01.04(5) Gas Migration Control Standards

- (a) *Class I Disposal Facilities must be designed, constructed, operated, and maintained such that any gases generated by decomposition or other reaction of solid waste are collected and vented, recovered, or otherwise managed such that:*

1. *There is no buildup of gas pressure under the final cover such that the functions of such cover (including any cap) are comprised;*
2. *The concentration of explosive gases in facility structures (excluding gas control or recovery system components) does not exceed 25 percent of the lower explosive limit for the gases; and*
3. *The concentration of explosive gases at the property boundary does not exceed the lower explosive limit for the gases.*



EWS CLASS II LANDFILL CLOSURE / POST CLOSURE PLAN



4. *The minimum frequency of monitoring shall be quarterly and the operator shall keep records to comply with the monitoring and records requirements at Rule 0400-11-01-.05(4)(a)(9); and*
5. *Within 60 days of detection, above the limits set in parts 1, 2, and 3 of this subparagraph, implement a Department approved remediation plan for the methane gas releases.*

The aforementioned “**Landfill Gas Monitoring Plan**” (**Document V**) has been prepared to address each of the five requirements outlined above. Initially, the groundwater monitor wells will serve as landfill gas monitoring wells. Probes may also be included as necessary.

GROUNDWATER MONITORING SYSTEM POST CLOSURE ACTIVITIES

6. *Maintain and monitor the ground and/or surface water monitoring system (if such is present at the facility). The monitoring system and sampling and analysis program established in the permit shall be continued during the post-closure care period, unless the permit is modified to establish a different system or program. Monitoring data must be reported in writing to the Division Director within 30 days after the completion of the analyses; and*

Groundwater monitoring wells have been installed at this facility. A Groundwater Monitoring Plan, **Document IV** of this permit application provides a list of the specific chemical parameters that will be used to determine impacts to the groundwater, during the operational life of the facility and during the post-closure care period.

7. *Following completion of the post-closure care period for each SWLF unit, the owner or operator must file with the Department a certification signed by an independent registered professional engineer verifying that post-closure has been completed in accordance with the post- closure plan.*

EWS will notify the Division Director in writing of its completion of closure of the disposal facility within 60 days of final closure per Rule 0400-11-01-.04(8)(c)(9). Such notification must include a certification by and/or a Tennessee registered professional engineer that the disposal facility has been closed in accordance with the approved Closure/Post-Closure Plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved Closure/Post-Closure Plan. Within 21 days of the receipt of such notice the Division Director shall inspect the facility to verify that closure has been completed and in accordance with the approved plan. Within 10 days of such verification, the Commissioner shall approve the closure in writing to the operator. Closure shall not be considered final and complete until such approval has been made. Any corrective work required by the Division shall be promptly undertaken. Cracked, uneven, and eroded areas in the final cover shall be repaired as soon as possible.

- (f) *Notice in Deed to Property - The operator must ensure that, within 90 days of completion of final closure of the facility and prior to sale or lease of the property on which the facility is located, there is recorded, in accordance with State law, a notation on the deed to the property or on some other instrument which is normally examined*



EWS CLASS II LANDFILL CLOSURE / POST CLOSURE PLAN



during title search that the land has been used as a disposal facility and its use is restricted in accordance with the approved closure/post-closure plan.

Within 90 days after final closure activities have been completed and prior to the sale or lease of the Property, EWS shall record a notation on the deed to the property stating that the land has been used as a Class II Industrial Waste Landfill facility and the use of the property is restricted in accordance with the approved closure/post-closure plan.

Post-Closure care will be provided at the site for a period of thirty (30) years after the facility is closed. During the post-closure care period, EWS will, at a minimum, perform the following activities:

EWS personnel will conduct inspections annually during the post-closure period. The inspections will be conducted to ensure compliance with all post-closure requirements. All inspection activities will be adequately documented and will include the date of inspection, the area undergoing inspection, and the results of each inspection. Documentation will be kept in a filing system that is readily accessible to the owner, engineer, and regulatory agency officials.

Groundwater and surface water monitoring will continue during the post-closure care period

III. PLANNED USE OF THE FACILITY AT THE END OF THE POST CLOSURE PERIOD

At the end of the post-closure care period, the operator of the facility will file a certification signed by a registered professional engineer verifying that post-closure has been completed in accordance with the post-closure plan. Tentative plans for the facility and adjoining properties after the post closure care period involve some sort of recreational type facility.

IV. CONTACT

*Mr. Chris White - President
Environmental Waste Solutions, LLC
4521 Trousdale Drive,
Nashville, Tennessee 37204
Telephone (615) 277-5579, or
Contact: Landfill Operations Manager
Telephone: (731) 441-8009*

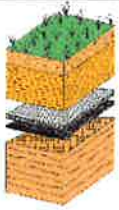
V. COST ESTIMATE

1. Closure Costs

In accordance with this rule the following closure cost estimate is presented. The closure costs for Phase 1 of this facility are estimated to be **\$853,788.72**. The total closure cost for the entire proposed footprint is **\$1,660,838**. **Appendix II** provides a breakdown of the closure cost as estimated using "Work Sheet A" developed by the TDSWM.

2. Post-Closure Care Costs

In accordance with this rule the following post closure care costs are summarized in **Table 3**.



EWS CLASS II LANDFILL CLOSURE / POST CLOSURE PLAN

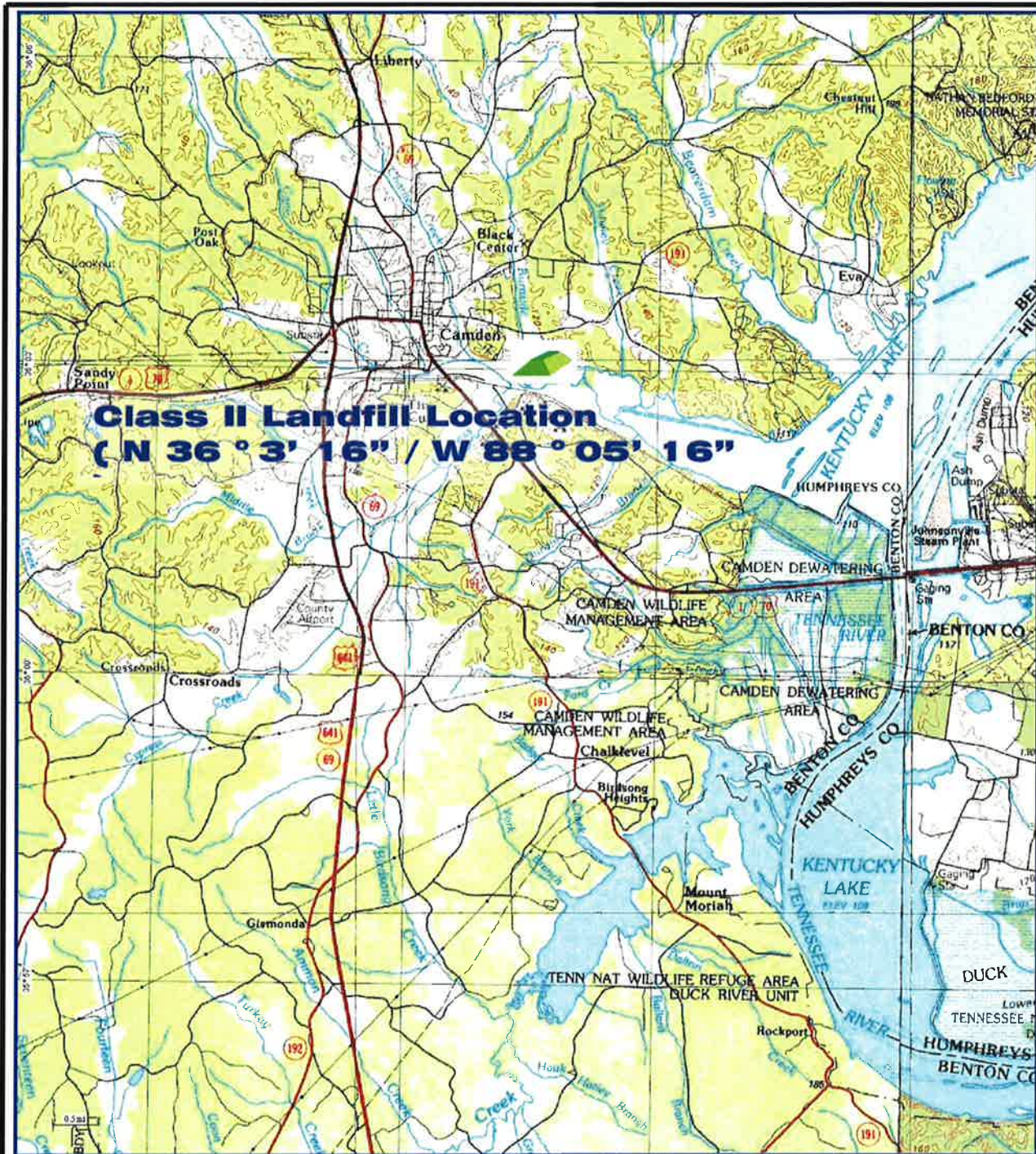


Table 3 - Summary of Post Closure Care Costs

Year(s)	Annual Post Closure Care Cost	Annual Post Closure Care Cost
	First Five Year Phase	Total Site
1-30	\$25,978.17	\$42,648

“Work Sheet B” developed by the TDSWM is provided in **Appendix II** which details the list of the tasks and estimated costs for post-closure care.

APPENDIX I
MAP



Source: USGS Camden Quadrangle



FIGURE 1: SITE LOCATION MAP

HE PROJECT
20114

DATE 05/24/11

DWN. BY: JKH

CHKD. BY: JKH

SCALE: Not To Scale

SHEET 1 OF 1



HOUSE ENGINEERING LLC

HOUSE ENGINEERING LLC

7308 River Park Drive

Nashville, Tennessee 37221

APPENDIX II
CLOSURE / POST CLOSURE COST ESTIMATES /
WORKSHEETS

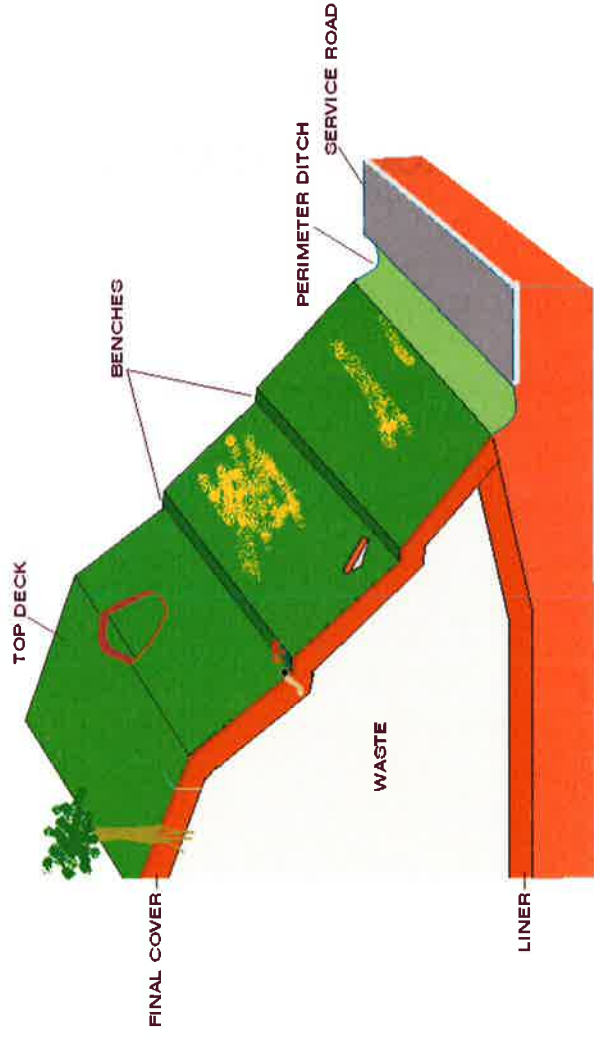
APPENDIX III
PROCEDURES FOR POST CLOSURE CARE COMPLETION

EVALUATE FINAL COVER IMPACTS AT CLOSURE AND POST CLOSURE

I. Final Cover Monitoring System

FINAL COVER MAINTENANCE TASKS DURING POST CLOSURE	DESCRIPTION OF TASKS
Step One	Inspect Final Cover at Closure for the following potential impacts: Erosional Rills, Animal Burrows, Desiccation Cracks, Stressed and/or Inappropriate Vegetation, Exposed Waste, Slope Failures,
Step Two	Enter Quarterly Post Closure Monitoring of the Final Cover for the Conditions Outlined in Step One and Perform Corrective Action if necessary
Step Three	If the results of groundwater monitoring performed for a period of time show no impact to water bodies in conjunction with computer modeling demonstration exit Post Closure Monitoring of the Final Cover.
Step Four	Begin Surveillance Monitoring of the Final Cover on an interval that is appropriate for the proposed End Use of the site.
Step Five	Demonstrate with historical data and computer modeling that there is no further threat to human health and the environment and discontinue monitoring.

LANDFILL FINAL COVER SYSTEM



EVALUATE GROUNDWATER IMPACTS AT CLOSURE AND POST CLOSURE

II. Groundwater Monitoring System

GROUNDWATER MONITORING TASKS DURING POST CLOSURE	DESCRIPTION OF TASKS
Step One	Review Historical Groundwater Data for Compliance
Step Two	Enter Post Closure Groundwater Monitoring
Step Three	If the results of groundwater monitoring performed for a period of time show no impact to water bodies exit Post Closure Monitoring and begin Surveillance Monitoring.
Step Four	Perform surveillance monitoring program until no potential impacts are present.
Step Five	Demonstrate with historical data and computer modeling that there is no further threat to human health and the environment and discontinue monitoring.

TYPICAL LANDFILL CROSS SECTION



SUMMARY OF PERFORMANCE BASED POST CLOSURE RESPONSIBILITIES

<i>Post-Closure Care (PCC) Control System</i>	<i>Purpose of PCC Control System</i>	<i>Criteria for Evaluation of Required Service Life of PCC System</i>	<i>Justification for Discontinuing PCC System Operation</i>
Final Cover System	Control of the following: <ul style="list-style-type: none"> ● Infiltration ● Direct Exposure to Waste ● Slope Stability ● Landfill Gas Emissions 	Loss of, or changes to, cap integrity must not adversely affect any of the purposes listed. Long-term condition of cap must be compatible with end-use obligations for the site.	Demonstrate Effectiveness of cap based on other PCC systems required use. i.e. no impacts to Groundwater or LFG Emissions.
Leachate Collection and Recovery System (LCRS)	Contain, Collect and Treat Leachate to prevent adverse impacts of leachate to surface water and groundwater, or as seeps.	No risk of impacts from uncontrolled releases of leachate. In addition, operation of LCRS must not be necessary to maintain geotechnical stability.	Perform sufficient monitoring for a period of time to demonstrate no further potential for releases to receiving water bodies.
Landfill Gas Collection System (LFGCS)	Collect Landfill Gas to prevent impacts to Groundwater and the Atmosphere	The generation of LFG is no longer sufficient to operate the collection system.	
Groundwater Monitoring System	Demonstrate that there are no unacceptable impacts to groundwater.	Monitor groundwater quality for an exceedance of groundwater MCL's.	

APPENDIX IV
HELP MODEL COMPUTER OUTPUT FILE

