

**ATTACHMENT 8**  
**POST-CLOSURE PLAN**

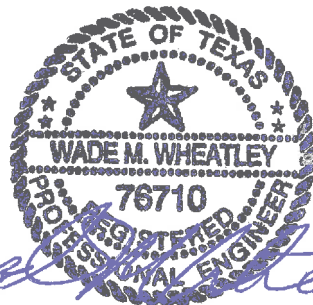
**NOVEMBER 7, 2013**  
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**AUGUST 15, 2014**

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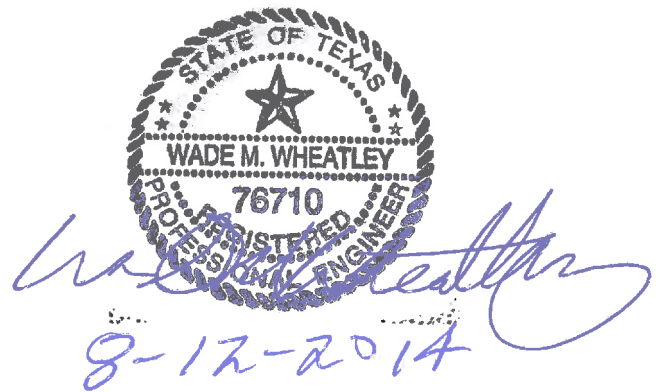


*Wade M. Wheatley*  
8-12-2014



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8-12-2014



## **ATTACHMENT 8**

### **POST-CLOSURE PLAN 330.63 (i)**

#### **1.0 INTRODUCTION**

This Post-Closure Plan was prepared in accordance with 30 TAC 330.63(i) and 30 TAC 330, Subchapter K, and will be maintained in the site operating record. Included in this plan are monitoring and maintenance activities required in 330.463(b)(1); contact information for the person(s) responsible for overseeing or conducting the post-closure care activities; planned uses (if any) of any portion of the closed facilities during the post-closure period; and an estimate of the costs to implement post-closure activities throughout the post-closure period.

#### **2.0 REQUIREMENTS - 330.463**

After certified closure of the landfill, activities described in this Post-Closure Plan will be implemented at the facility. The Post-Closure Plan will incorporate the approved Landfill Gas Management Plan for this facility.

The Post-Closure Plan will be in effect for a thirty year period, or as modified by the Executive Director to ensure that the closed landfill facility will continue to retain its integrity and will not pose a threat to human health or the environment. Once approved, the Post-Closure Plan will be kept in the Site Operating Record.

The facility owner and/or operator will maintain right-of-entry to the site. The integrity and effectiveness of the final cover, site vegetation, and drainage control system will be maintained. During the post-closure period, the owner and/or operator will correct the effects of settlement, subsidence, and ponded water and will monitor methane gas and prevent any surface run-on and runoff from eroding or otherwise damaging the final cover system.

As of the date of this post-closure plan, the person(s) listed below are responsible for the management of the Post Oak Landfill:

President  
Post Oak Clean Green, Inc.  
P.O. Box 1270  
Sequin, Texas 78155  
(888) 885-6606



If the above information changes, Post Oak will update this Post-Closure Plan to incorporate such changes.

### **3.0 MONITORING AND MAINTENANCE ACTIVITIES - 330.463(b)(3)(A)**

#### **3.1 FINAL COVER SYSTEM MONITORING AND MAINTENANCE - 330.463(b)(1)(A)**

Monitoring and maintenance activities will be performed during the post-closure period in order to maintain the integrity and effectiveness of the final cover system, including the final cover vegetation and drainage controls. At a minimum, site inspections will be performed semiannually to assess the need for maintenance or repair of the final cover system, vegetation and drainage control structures. Items included in this assessment may include inspection for evidence of landfill gas migration or accumulation such as odors or vegetative stress. Erosion cuts and depressions in the final cover will also be noted and repaired. Erosion gullies or washed-out areas deep enough to jeopardize the final or intermediate cover must be repaired within 5 days of detection by restoring the cover material, grading, compacting, and seeding unless the commission's regional office approves otherwise, based in the extent of damage requiring more time to repair or the repairs are delayed because of weather conditions. In addition, drainage controls will be inspected for damage and debris or sediment build-up. Maintenance may include performing final cover repairs to fill erosion gullies and low areas. Drainage systems may be regraded as necessary or cleaned of debris and sediment. Maintenance will be performed and damage will be repaired as quickly as practical.

#### **3.2 LEACHATE COLLECTION SYSTEM - 330.463(b)(1)(B)**

Post Oak will maintain and operate the leachate collection system in accordance with the requirements of 30 TAC 330.331 and 330.333.

#### **3.3 GROUNDWATER MONITORING -330.463(b)(1)(C)**

Post Oak will continue to monitor groundwater in accordance with 30 TAC 330, Subchapter J and maintain the groundwater monitoring system.



### 3.4 GAS MANAGEMENT -330.463(b)(1)(D)

Landfill gas monitoring activities will continue throughout the post-closure period as they did during operations. Quarterly boundary and continuous structure monitoring will be conducted in accordance with the Landfill Gas Management Plan and 30 TAC 330, Subchapter I.

### 3.5 EARTH ELECTRICAL RESISTIVITY SURVEYS (330.463(b)(1)(E))

Earth electrical resistivity surveys are not a part of the Site Development Plan and are not anticipated to be necessary during post-closure.

## 4.0 POST-CLOSURE LAND USE - 330.463(b)(3)(C)

Post-closure land use will be in accordance with 330, Subchapter T. Currently, the future use of the closed landfill is planned to be open space or grazing. Because of the potential hazard to public health, groundwater, and the environment if closed landfilled areas are disturbed, TCEQ has put into effect the following guidelines for land use after the landfill facility has been closed.

1. Plans for proposed construction or structural improvements must be submitted to TCEQ for approval.
2. An independent registered professional engineer will provide documentation assuring construction or structural improvements will neither increase threat to human health or the environment nor disturb the integrity of the final cover, liners, or containment or monitoring systems.
3. Construction or structural improvements shall have automatic methane gas sensors designed to trigger an alarm when methane concentrations are greater than 1% by volume in air installed in buildings and enclosed structures used for human occupancy.
4. Enclosed subgrade construction is prohibited.
5. All buildings and structures should be constructed with active gas collection or vent systems to mitigate the effects of gas accumulation.
6. Unauthorized pilings in or through the final cover or any liner are prohibited.



7. Unauthorized borings or other penetrations of the final cover or any liner are prohibited.
8. On-site, permanently enclosed structures built on-grade within 1,000 ft of any waste filled area will have a geomembrane or equivalent with very low gas permeability constructed between the slab and subgrade with at least 12" of open graded, clean aggregate material between the geomembrane and the slab or subgrade as a permeable layer. The design will include a geotextile filter to prevent fine soil from infiltrating to the permeable layer and perforated venting pipes in permeable layer designed to operate without clogging. These venting pipes will connect to an induced-draft exhaust system.
9. Automatic methane gas sensors will be installed in the venting pipes or the permeable gas layer as well as inside buildings. These sensors will be triggered to sound an audible alarm when methane gas concentrations are greater than 25% of the lower explosive limit.

#### **5.0 COMPLETION OF POST-CLOSURE CARE MAINTENANCE - 330.465**

Upon completion of the post-closure period, the owner and/or operator will submit to TCEQ documented certification signed by an independent registered professional engineer verifying post-closure care is complete in accordance with the Post-Closure Plan and request voluntary revocation of the landfill permit.

#### **6.0 COST ESTIMATE FOR POST-CLOSURE CARE - 330.507**

A post-closure cost estimate has been prepared in accordance with 30 TAC Chapter 330, Subchapter L and developed based on the cost, in current dollars, of hiring a third party to conduct post-closure care activities for the disposal facility, including annual and periodic costs. The completed, closed landfill area will consist of about 331 acres including primarily the disposal area and the perimeter berm. Initially, two cells are planned to be constructed and operated for landfill disposal. The citizen convenience area (CCA) is also planned for initial operations. Therefore, during early operations of the landfill, the two-cell portion of the landfill is the largest area that could require post-closure care. The CCA will not contain wastes after closure and will not require post-closure care. Based on this information two 30-year post-closure care costs are provided in Appendix 8A – one for the entire facility (presented as Table



8A-1), and the second for the first 2 cells of the landfill that will be constructed (presented as Table 8A-2).

During the active life of the site, the applicant will annually adjust the cost estimate for inflation. Any inflation adjustments must be made within 60 days prior to the anniversary date of the establishment of the post-closure financial assurance instrument(s) and will be in accordance with 37, Subchapter R. Continuous financial assurance will be provided until the post-closure care period is officially completed and released in writing by TCEQ.

Also, during the active life of the site, the cost estimate and the amount of financial assurance may either be increased or reduced. A reduction in the cost estimate must be approved by the TCEQ as a modification to the permit. After the TCEQ has approved the modification, Post Oak will submit the request to reduce the cost estimate and the financial assurance within 60 days prior to the anniversary date for the annual review and shall include the documentation necessary for the annual review.





## TABLE



**TABLE 1  
MONITORING AND MAINTENANCE ACTIVITY SCHEDULE**

<b>Monitoring and Maintenance Activity</b>	<b>Schedule</b>
Final Cover Monitoring and Maintenance (330.463(b)(1)(A))	Semiannually
Groundwater Monitoring (330.463(b)(1)(C))	Semiannually
Landfill Gas Monitoring (330.463(b)(1)(D))	Quarterly
General Facility Inspection/Maintenance	Semiannually



**APPENDIX 8A**  
**POST-CLOSURE COST ESTIMATES**



**TABLE 8A-1 - POST OAK LANDFILL  
POST-CLOSURE COST ESTIMATE FOR ENTIRE LANDFILL**

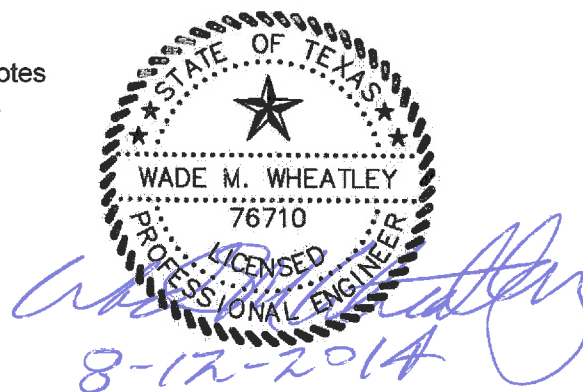
<u>ENGINEERING<sup>1</sup></u>	<u>UNIT</u>	<u>COST</u>	<u>ANNUAL QUANTITY</u>	<u>TOTAL COST</u>
Development of Post-Closure Plan	NA	\$0	NA	\$0
Site Inspection and Recordkeeping	AC	25	6 x 1003*	\$150,450
Correctional Plans	AC	40	331	13,240
Groundwater Monitoring/Management	EA	750	2 x 96	144,000
Gas Monitoring	EA	125	4 x 17	8,500
Leachate Disposal	GAL	0.15	710 x 331	35,252
<b><u>CONSTRUCTION<sup>1</sup></u></b>				
Site Maintenance, Correctional Construction	AC	\$160.00	331	52,960
SUBTOTAL (ENGINEERING + CONSTRUCTION)				\$404,402
15% Contingency				<u>60,660</u>
ANNUAL ENGINEERING + CONSTRUCTION TOTAL				<b>\$465,062</b>
<b>ADMINISTRATION</b>	10	%		46,506

\*\*\*TOTAL ANNUAL POST-CLOSURE COST = \$511,569  
TOTAL 30-YEAR POST-CLOSURE COST (X 30) = \$15,347,056

NOTES:

1) Refer to Cost Assumptions Table in this appendix and following notes for basis for each unit cost. Cost estimates provided in 2013 dollars.

\*The facility's permit boundary is approximately 1003 acres, with a maximum waste footprint of approximately 331 acres.





**TABLE 8A-1 - POST OAK LANDFILL  
POST-CLOSURE COST ESTIMATE COST ASSUMPTIONS**

<b>Cost Description</b>	<b>Unit Rate</b>	<b>Costing Assumptions</b>
Development of Post-Closure Plan	\$0	Zero cost assumed because Post-Closure Plan has already been developed.
Site Inspection and Recordkeeping	\$25/AC	Cost based on experience and similar submittals. Cost assumes that inspection of landfill areas will cost more than \$25/acre and that outlying portions of the permit area will cost less, resulting in an average cost of \$25/acre. Also assumes semiannual inspections plus 4 storm events (1 per quarter) that exceed 0.5 inches.
Correctional Plans	\$40/AC	Cost based on experience and similar submittals. Refers to plans to correct issues identified during site inspections. Costs to resolve those issues are provided under the "Site Maintenance, Correctional Construction" heading.
Groundwater Monitoring/ Management	\$750 EA	Assumes an analytical cost of \$345 per well (\$207 for metals & \$138 for VOCS) plus 4.5 staff hours, or \$375, to collect each sample and document the results on a semiannual basis.
Gas Monitoring	\$125 EA	Cost based on a recent project. Assumes quarterly monitoring of 17 probes for the entire landfill and 5 probes for the initial 2 cells.
Leachate Disposal	\$0.15/GAL	Cost based on experience. Assumes 710 gallons of leachate per acre of landfill per year as modeled for the Case 4 closed landfill in Annex 3C-1B. Leachate disposal is at a publically owned treatment works.
Site Maintenance, Correctional Construction	\$160/AC	Cost based on experience and similar submittals. This estimate represents the annual cost to resolve issues identified during Site Inspections.



**TABLE 8A-2 - POST OAK LANDFILL  
POST-CLOSURE COST ESTIMATE FOR INITIAL 2 CELLS OF LANDFILL**

<u>ENGINEERING<sup>1</sup></u>	<u>UNIT</u>	<u>COST</u>	<u>ANNUAL QUANTITY</u>	<u>TOTAL COST</u>
Development of Post-Closure Plan	NA	\$0	NA	\$0
Site Inspection and Recordkeeping	AC	20	6 x 1003*	\$120,360
Correctional Plans	AC	40	25**	1,000
Groundwater Monitoring/Management	EA	750	2 x 56	84,000
Gas Monitoring	EA	125	4 x 5	2,500
Leachate Disposal	GAL	0.15	710 x 25**	2,663
<b><u>CONSTRUCTION<sup>1</sup></u></b>				
Site Maintenance, Correctional Construction	AC	\$160.00	25	4,000
SUBTOTAL (ENGINEERING + CONSTRUCTION)				\$214,523
15% Contingency				<u>32,178</u>
ANNUAL ENGINEERING + CONSTRUCTION TOTAL				<b>\$246,701</b>
<b>ADMINISTRATION</b>	10	%		24,670

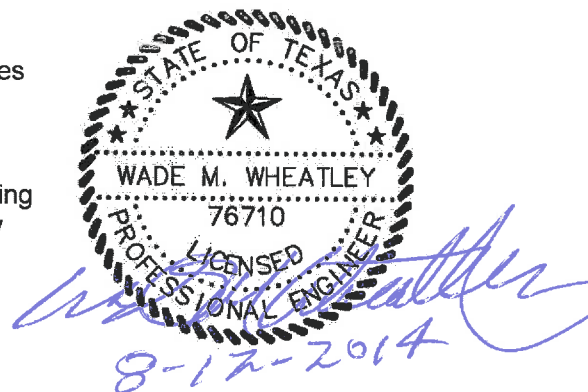
\*\*\*TOTAL ANNUAL POST-CLOSURE COST = \$271,372  
TOTAL 30-YEAR POST-CLOSURE COST (X 30) = \$8,141,148

NOTES:

1) Refer to Cost Assumptions Table in this appendix and following notes for basis for each unit cost. Cost estimates provided in 2013 dollars.

\*The facility's permit boundary is approximately 1003 acres.

\*\*For early landfill operations, the maximum area of landfill ever requiring closure is 25 acres. This area corresponds to two active cells (roughly 22.7 acres) plus 10% to account for sideslopes.





**TABLE 8A-2 - POST OAK LANDFILL  
POST-CLOSURE COST ESTIMATE COST ASSUMPTIONS**

<b>Cost Description</b>	<b>Unit Rate</b>	<b>Costing Assumptions</b>
Development of Post-Closure Plan	\$0	Zero cost assumed because Post-Closure Plan has already been developed.
Site Inspection and Recordkeeping	\$20/AC	Cost based on experience and similar submittals. Assumes semiannual inspections plus 4 storm events (1 per quarter) that exceed 0.5 inches. Cost assumes that inspection of landfill areas will cost more than \$25/acre and that outlying portions of the permit area will cost less, resulting in an average cost of \$20/acre. A lower average cost is presented in Table 8A-2 versus 8A-1 because the vast majority of the permit area will be undeveloped. Also assumes semiannual inspections plus 4 storm events (1 per quarter) that exceed 0.5 inches.
Correctional Plans	\$40/AC	Cost based on experience and similar submittals. Refers to plans to correct issues identified during site inspections. Costs to resolve those issues are provided under the "Site Maintenance, Correctional Construction" heading.
Groundwater Monitoring/ Management	\$750 EA	Assumes an analytical cost of \$345 per well (\$207 for metals & \$138 for VOCS) plus 4.5 staff hours, or \$375, to collect each sample and document the results on a semiannual basis. This plan also assumes that the monitoring wells will be installed in phases, and that 56 wells will be installed prior to the construction of cells 1 and 2 of the landfill. Refer to Attachment 5, Table 5-2 for a summary of which monitoring wells will be installed prior to the construction of specific landfill cells.
Gas Monitoring	\$125 EA	Cost based on a recent project. Assumes quarterly monitoring of 17 probes for the entire landfill and 5 probes for the initial 2 cells.
Leachate Disposal	\$0.15/GAL	Cost based on experience. Assumes 710 gallons of leachate per acre of landfill per year as modeled for the Case 4 closed landfill in Annex 3C-1B. Leachate disposal is at a publically owned treatment works.
Site Maintenance, Correctional Construction	\$160/AC	Cost based on experience and similar submittals. This estimate represents the annual cost to resolve issues identified during Site Inspections.