



Closure Plan Jeffrey Energy Center Fly Ash Landfill

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Plan Review/Amendment Log §257.102(b)(3)

Date of Review	Reviewer Name	Amendment Required (YES/NO)	Sections Amended and Reason



CCR Regulatory Requirements

USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(a) stipulates:</p> <p><i>(a) Closure of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit, as described in paragraphs (b) through (j) of this section. Retrofit of a CCR surface impoundment must be completed in accordance with the requirements in paragraph (k) of this section.</i></p>	<p>Section 1.0, Page 1</p>
<p>§257.102(b)(1) stipulates:</p> <p><i>(b) Written closure plan—(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.</i></p>	<p>Section 4.0, Page 7</p>
<p>§257.102(b)(1)(i) stipulates:</p> <p><i>(i) A narrative description of how the CCR unit will be closed in accordance with this section.</i></p>	<p>Section 4.1, Page 7</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(b)(1)(iii) stipulates:</p> <p><i>(iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.</i></p>	<p>Section 4.2, Page 7</p>
<p>§257.102(b)(1)(iv) stipulates:</p> <p><i>(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.</i></p>	<p>Section 3.5, Page 5</p>
<p>§257.102(b)(1)(v) stipulates:</p> <p><i>(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.</i></p>	<p>Section 3.6, Page 6</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(b)(1)(vi) stipulates:</p> <p><i>(vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(b)(2)(i) stipulates:</p> <p><i>(2) Timeframes for preparing the initial written closure plan – (i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written closure plan consistent with the requirements specified in paragraph (b)(1) of this section.</i></p>	<p>Report submitted prior to October 17, 2016</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(b)(2)(iii) stipulates:</p> <p><i>(iii) The owner or operator has completed the written closure plan when the plan, including the certification required by paragraph (b)(4) of this section, has been placed in the facility's operating record as required by §257.105(i)(4).</i></p>	<p>Section 9.0, Page 15</p>
<p>§257.102(b)(3) stipulates:</p> <p><i>(3) Amendment of a written closure plan.</i></p> <p><i>(i) The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to paragraph (b)(1) of this section at any time.</i></p> <p><i>(ii) The owner or operator must amend the written closure plan whenever:</i></p> <p><i>(A) There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or</i></p> <p><i>(B) Before or after closure activities have commenced, unanticipated events necessitate a revision of the written closure plan.</i></p> <p><i>(iii) The owner or operator must amend the closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan. If a written closure plan is revised after closure activities have commenced for a CCR unit, the owner or operator must amend the current closure plan no later than 30 days following the triggering event.</i></p>	<p>Section 9.1, Page 15</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(b)(4) stipulates:</p> <p><i>(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.</i></p>	<p>Section 9.2, Page 16</p>
<p>§257.102(d)(1) stipulates:</p> <p><i>(d) Closure performance standard when leaving CCR in place – (1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:</i></p> <p><i>(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate or contaminated run-off to the ground or surface waters or to the atmosphere;</i></p> <p><i>(ii) Preclude the probability of future impoundment of water, sediment or slurry;</i></p> <p><i>(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;</i></p> <p><i>(iv) Minimize the need for further maintenance of the CCR unit; and</i></p> <p><i>(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.</i></p>	<p>Section 7.0 – 7.5, Pages 12 – 13</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(d)(3)(i) stipulates:</p> <p><i>(3) Final cover system. If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section. (i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.</i></p> <p><i>(B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.</i></p> <p><i>(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.</i></p> <p><i>(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p>Section 4.2 and 5.0, Pages 7 and 9</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(d)(3)(ii) stipulates:</p> <p><i>(ii) The owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (f)(3)(ii)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.</i></p> <p><i>(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.</i></p> <p><i>(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p>Section 4.2, Page 7</p>
<p>§257.102(d)(3)(iii) stipulates:</p> <p><i>(iii) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the design of the final cover system meets the requirements of this section.</i></p>	<p>Section 11.0, Page 19</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(e)(1) stipulates:</p> <p><i>(e) Initiation of closure activities. Except as provided for in paragraph (e)(4) of this section and §257.103, the owner or operator of a CCR unit must commence closure of the CCR unit no later than the applicable timeframes specified in either paragraph (e)(1) or (2) of this section. (1) The owner or operator must commence closure of the CCR unit no later than 30 days after the date on which the CCR unit either:</i></p> <p><i>(i) Receives the known final receipt of waste, either CCR or any non-CCR waste stream; or</i></p> <p><i>(ii) Removes the known final volume of CCR from the CCR unit for the purpose of beneficial use of CCR.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(e)(3) stipulates:</p> <p><i>(3) For purposes of this subpart, closure of the CCR unit has commenced if the owner or operator has ceased placing waste and completes any of the following actions or activities:</i></p> <p><i>(i) Taken any steps necessary to implement the written closure plan required by paragraph (b) of this section;</i></p> <p><i>(ii) Submitted a completed application for any required state or agency permit or permit modification; or</i></p> <p><i>(iii) Taken any steps necessary to comply with any state or other agency standards that are prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(f)(1) stipulates:</p> <p><i>(f) Completion of closure activities. (1) Except as provided for in paragraph (f)(2) of this section, the owner or operator must complete closure of the CCR unit:</i></p> <p><i>(i) For existing and new CCR landfills and any lateral expansion of a CCR landfill, within six months of commencing closure activities.</i></p> <p><i>(ii) For existing and new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(f)(2)(i) stipulates:</p> <p><i>(2)(i) Extensions of closure timeframes. The timeframes for completing closure of a CCR unit specified under paragraphs (f)(1) of this section may be extended if the owner or operator can demonstrate that it was not feasible to complete closure of the CCR unit within the required timeframes due to factors beyond the facility's control. If the owner or operator is seeking a time extension beyond the time specified in the written closure plan as required by paragraph (b)(1) of this section, the demonstration must include a narrative discussion providing the basis for additional time beyond that specified in the closure plan. The owner or operator must place each completed demonstration, if more than one time extension is sought, in the facility's operating record as required by §257.105(i)(6) prior to the end of any two-year period. Factors that may support such a demonstration include:</i></p> <p><i>(A) Complications stemming from the climate and weather, such as unusual amounts of precipitation or a significantly shortened construction season;</i></p> <p><i>(B) Time required to dewater a surface impoundment due to the volume of CCR contained in the CCR unit or characteristics of the CCR in the unit;</i></p> <p><i>(C) The geology and terrain surrounding the CCR unit will affect the amount of material needed to close the CCR unit; or</i></p> <p><i>(D) Time required or delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(f)(2)(ii) stipulates:</p> <p>(2)(ii) <i>Maximum time extensions.</i></p> <p>(A) <i>CCR surface impoundments of 40 acres or smaller may extend the time to complete closure by no longer than two years</i></p> <p>(B) <i>CCR surface impoundments larger than 40 acres may extend the timeframe to complete closure of the CCR unit multiple times, in two-year increments. For each two-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of five two-year extensions may be obtained for any CCR surface impoundment.</i></p> <p>(C) <i>CCR landfills may extend the timeframe to complete closure of the CCR unit multiple times, in one-year increments. For each one-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of two one-year extensions may be obtained for any CCR landfill.</i></p>	<p>Section 8.0, Page 14</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(f)(2)(iii) stipulates:</p> <p><i>(iii) In order to obtain additional time extension(s) to complete closure of a CCR unit beyond the times provided by paragraph (f)(1) of this section, the owner or operator of the CCR unit must include with the demonstration required by paragraph (f)(2)(i) of this section the following statement signed by the owner or operator or an authorized representative:</i></p> <p><i>I certify under penalty of law that I have personally examined and am familiar with the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</i></p>	<p>Section 8.0, Page 14</p>
<p>§257.102(f)(3) stipulates:</p> <p><i>(3) Upon completion, the owner or operator of the CCR unit must obtain a certification from a qualified professional engineer verifying that closure has been completed in accordance with the closure plan specified in paragraph (b) of this section and the requirements of this section.</i></p>	<p>Section 11.0, Page 19</p>
<p>§257.102(g) stipulates:</p> <p><i>(g) No later than the date the owner or operator initiate closure of a CCR unit, the owner or operator must prepare a notification of intent to close a CCR unit. The notification must include the certification by a qualified professional engineer for the design of the final cover system as required by §257.102(d)(3)(iii), if applicable. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(7).</i></p>	<p>Section 9.1, Page 15</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(h) stipulates:</p> <p><i>(h) Within 30 days of completion of closure of the CCR unit, the owner or operator must prepare a notification of closure of a CCR unit. The notification must include the certification by a qualified professional engineer as required by §257.102(f)(3). The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(8).</i></p>	<p>Section 9.4, Page 17</p>
<p>§257.102(i) stipulates:</p> <p><i>(i) Deed notations. (1) Except as provided by paragraph (i)(4) of this section, following closure of a CCR unit, the owner or operator must record a notation on the deed to the property, or some other instrument that is normally examined during title search.</i></p> <p><i>(2) The notation on the deed must in perpetuity notify any potential purchaser of the property that: (i) The land has been used as a CCR unit; and (ii) Its use is restricted under the post-closure care requirements as provided by §257.104(d)(1)(iii).</i></p> <p><i>(3) Within 30 days of recording a notation on the deed to the property, the owner or operator must prepare a notification stating that the notation has been recorded. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(9).</i></p> <p><i>(4) An owner or operator that closes a CCR unit in accordance with paragraph (c) of this section is not subject to the requirements of paragraphs (i)(1) through (3) of this section.</i></p>	<p>Section 9.5, Page 17</p>



USEPA CCR Criteria 40 CFR 257.102	Jeffrey Energy Center (JEC) Closure Plan
<p>§257.102(j) stipulates:</p> <p><i>(j) The owner or operator of the CCR nit must comply with the closure recordkeeping requirements specified in §257.105(i), the closure notification requirements specified in §257.106(i), and the closure Internet requirements specified in §257.107(i).</i></p>	<p>Section 9.0, Page 15</p>



1.0 INTRODUCTION

CB&I Environmental and Infrastructure, Inc. (CB&I) has prepared the following Closure Plan (Plan) at the request of Westar Energy (Westar) for the Fly Ash Landfill located at its Jeffrey Energy Center (JEC) in St. Marys, Kansas. JEC is a coal-fired and natural gas-fired power plant that has been in operation since 1980. Fly ash is permitted for disposal within the Fly Ash Landfill at JEC. The Fly Ash Landfill includes the existing Fly Ash Area 1, which is operational, and the proposed Fly Ash Area 2. Both Fly Ash Area 1 and Fly Ash Area 2 have been deemed to be regulated coal combustion residual (CCR) units by the United States Environmental Protection Agency (USEPA) through the Disposal of Coal Combustion Residuals from Electric Utilities Final Rule (CCR Rule) 40 CFR §257 and §261.

This Plan details the closure requirements outlined in §257.102, for CCR units closed in place. The criteria for conducting the closure or retrofit of CCR units for the Fly Ash Area 1 (Fly Ash Area) Landfill are detailed in Section 2.0. Additionally, the following Plan details the necessary steps to close the Fly Ash Area Landfill at any point in the active life of the Fly Ash Area, based on recognized and good engineering practices. All closure processes have been established to control, minimize, and eliminate infiltration of liquids into waste and release of leachate.



2.0 REGULATORY OVERVIEW OF CCR PLAN REQUIREMENTS

On April 17, 2015, the USEPA published the CCR Rule under Subtitle D of the Resource Conservation and Recovery Act (RCRA) as 40 CFR Parts §257 and §261. The purpose of the CCR Rule is to regulate the management of CCR material in regulated CCR units for landfill and surface impoundments. The Fly Ash Area Landfill at JEC has been deemed to be a regulated CCR unit.

Section 257.102(b) of the CCR Rule requires owners or operators of CCR Landfills to prepare a written Plan describing the closure of the unit and schedule for implementation of the Plan. The following citations from the CCR Rule are applicable for the Fly Ash Area Landfill, which is discussed in this Plan:

§257.102(b)(1) stipulates:

(b) Written closure plan – (1) Content of the plan. “The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section

- (i) A narrative description that discusses how the CCR unit will be closed in accordance with this section.*
- (ii) If closure of the CCR unit will be accomplished through removal of CCR from the CCR unit, a description of the procedures to remove the CCR and decontaminate the CCR unit in accordance with paragraph (c) of this section.*
- (iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed and methods and procedures to be used to install the final cover will achieve performance standards specified in paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system achieves the performance standards specified in paragraph (d) of this section.*
- (iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit.*
- (v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.*
- (vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.*



§257.102(b)(iii) outlines closure performance standards for closure of units where CCR material will be left in place. This section requires a description of the final cover system and the design, methods, and procedures to be used to install the final cover to ensure that it will achieve the performance standards specified in and §257.102(d), which stipulates:

(d) Closure performance standard when leaving CCR in place – “(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:

- (i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or the atmosphere;*
- (ii) Preclude the probability of future impoundment of water, sediment or slurry;*
- (iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during closure and post-closure period;*
- (iv) Minimize the need for further maintenance of the CCR unit; and*
- (v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.”*

Moreover, the final cover system has been planned in accordance with the following requirements of §257.102(d)(3), which stipulates:

“(3) Final cover system. If a CCR unit is closed by leaving CCR in place the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.

- (i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.*
 - (A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.*
 - (B) The infiltration of liquids through the CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.*
 - (C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.*
 - (D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.”*

In addition to the above, the Plan must also ensure compliance with the closure recordkeeping requirements specified in §257.105(i), the closure notification requirements specified in §257.106(i), and the closure intent requirements specified in §257.107(i). A written certification is provided in Section 11.0 from a qualified professional engineer in the State of Kansas, to certify that this Plan meets the requirements of the CCR Rule.



3.0 JEC FLY ASH AREA LANDFILL OVERVIEW

3.1 Location, Topography, and Description

The Fly Ash Area Landfill at JEC is currently utilized for the disposal of fly ash. The closure of the Fly Ash Area Landfill will be accomplished by leaving the CCR material in place. The following Plan was developed to satisfy the CCR Rule requirements for in place closure §257.102(b)(1)(iii).

The Fly Ash Area Landfill is located in St. Marys, Kansas, approximately 4.5 miles west of Highway 63. The Fly Ash Area Landfill is located within JEC, north of the Tower Hill Lake and west of Fly Ash Area 2, as detailed in **Figure 1**.

The Fly Ash Area Landfill totals at approximately 98.8 acres. It consists of large berms and deep ravines in the northern and southern portions, which are being filled with fly ash, and is more flat in the central portion of the area. The topography varies across The Fly Ash Area Landfill, ranging in elevation from 1,190 to 1,247 feet mean sea level (ft MSL). The existing site topography is depicted in **Figure 2**.

JEC has been designated as a critical habitat by the Kansas Department of Wildlife, Parks, and Tourism for the endangered avian species, Least Tern. The Least Terns currently nest in various locations on the Fly Ash Area Landfill. The current Least Tern boundary fence is depicted in **Figure 3**, and is approximately 34.5 acres in size. Fly ash infilling is not undertaken within these designated nesting areas during the breeding season, which is from May through August. The Fly Ash Area Landfill is graded prior to the start of the nesting season and is blocked off to prohibit disturbance from vehicles once the nesting season has started. Westar works closely with the U.S. Fish & Wildlife Service and the Kansas Department of Wildlife, Parks and Tourism, Ecological Services Section on protection of the Least Tern at JEC.

3.2 Existing Regulatory Permits and Consents

Westar was granted an Industrial Landfill Permit at JEC by the Kansas Department of Health and Environment – Bureau of Waste Management (KDHE-BWM) for the Fly Ash Area Landfill through Industrial Landfill Permit No. 0359 (Industrial Landfill Permit), in accordance with Kansas Statutes Annotated (KSA) 65-3407. KDHE modified the permit, per K.A.R 28-29-6a, in response to the CCR Rule to include all on-site CCR material units as disposal areas under the existing solid waste permit for JEC. The current Industrial Landfill Permit modification was approved on October 15, 2015. This allows CCR generated on-site to be properly disposed within the Industrial Landfill Permit boundary, including the Fly Ash Area Landfill. As part of this permit, the Fly Ash Area Landfill has previously approved final grades, which are depicted in **Figure 4**.

3.3 Fly Ash Generation, Recycling, and Disposal

Fly ash has been generated at JEC since operations began in 1980. At JEC's facility, fly ash is removed from the combustion gas stream in an electrostatic precipitator. Fly ash is typically a fine, spherical particle ranging in diameter from 0.5 to 100 microns and it can be used as a soil or aggregate stabilization agent. The color of fly ash typically varies from black to cream and is composed of silica, alumina, iron oxide, lime, and trace elements.



The fly ash that is generated at JEC has historically been recycled, landfilled, or mixed with bottom ash to provide a base for JEC's roads. Recycled fly ash rates depend on the market demand and can affect the life of the Fly Ash Area Landfill due to the variability in the amount of recycled material. Disposal rates therefore vary based on recycling opportunities, which vary between years.

3.4 Fly Ash Area Landfill Operations

Currently transport trucks discharge their loads of fly ash in the Fly Ash Area Landfill. While the fly ash is being unloaded it is hydrated to minimize the amount of dust created, as per the dust control plan. The fly ash is then spread evenly with dozer equipment and compacted so that it will harden as it dries. Straight hardened fly ash has a theoretical hydraulic conductivity range of 10^{-6} centimeters per second (cm/sec) to 10^{-7} cm/sec; due to the desirable characteristics of the material, the fly ash will be a suitable material to be utilized as a subgrade material prior to placement of the final cover system. Periodic grading is undertaken for the Fly Ash Area Landfill as required within the active area to maintain a relatively uniform height.

Daily and intermediate covers are not applied as part of the operational activities for the active area. Weekly (7-day) and annual inspections and associated reporting are undertaken for the CCR unit in line with JEC inspection requirements in 40 CFR §257.84(b): Inspection Requirements for CCR Landfills. Any operational modifications which require attention will be identified as part of the inspection and reporting requirements for the Fly Ash Area Landfill.

Stormwater control measures including dikes, berms, and other features will be constructed as necessary and in accordance with the Run-on and Run-off Control Plan for the Fly Ash Area Landfill. Perimeter berms are constructed ahead of the fly ash placement to prevent stormwater erosion and provide run-on and run-off control. An example of this is the hardened fly ash dike, which was constructed to the south of the Fly Ash Area Landfill to an elevation of 1,210 feet MSL, as seen in **Figure 4**.

3.5 Remaining Fly Ash Area Landfill Volume and Life (§257.102(b)(1)(iv))

The total disposal capacity of the Fly Ash Area Landfill is approximately 3,746,000 cubic yards (cy), as stated in the 2015 Annual Landfill Inspection. AutoCAD Civil 3D surface comparisons were used to determine the remaining capacity of the Fly Ash Area Landfill. The top of waste elevations from the most recent survey conducted by Professional Engineering Consultants (PEC), in April 2016, was compared to the final design top of waste elevations. The final design top of waste elevations were estimated by lowering the permitted final grades, shown in **Figure 4**, by two feet (accounting for the 18-inch infiltration layer and the 6-inch erosion control layer). From the comparison between these surfaces, the remaining capacity of the Fly Ash Area Landfill was determined to be approximately 657,054 airspace cy (ascy).

As detailed in the 2015 Annual Report, the average fill rate for the Fly Ash Area Landfill is approximately 60,360 tons per year of CCR material. The dry density of the fly ash for JEC is approximately 80 pounds per cubic foot (lb/ft^3) (or 1.08 tons per cubic yard (tons/cy) dry weight), and the average volume fill rate is approximately 55,889 cubic yards per year (cy/yr). At this fill rate and the estimated remaining capacity determined in AutoCAD, the remaining life of the Fly Ash Area Landfill was determined to be approximately 11 years (year 2027).



3.6 Largest Area Requiring Final Cover (§257.102(b)(1)(v))

The Fly Ash Area Landfill has been designed, and will be operated so that contemporaneous operation and closure occurs. The final cover will be constructed in stages so as to facilitate Fly Ash Area Landfill operational requirements. Approximately 6.9 acres of the south slope of the Fly Ash Area Landfill is capped. Therefore, the largest area requiring final cover at any time during the CCR unit's operating period is estimated to be the current operational area for the Fly Ash Area Landfill, which is approximately 91.9 acres in size.



4.0 CLOSURE PLAN (§257.102(b)(1))

This Plan has been prepared in accordance with requirements of the CCR Rule and includes a written certification in Section 11.0 from a qualified professional engineer for the State of Kansas.

4.1 Narrative Description (§257.102(b)(1)(i))

Closure of the Fly Ash Area Landfill will be accomplished by leaving the CCR material in place. The method of closure has been designed to minimize maintenance, leachate generation, control run-on and run-off, and ensure the protection of human health and the environment. Closure of the Fly Ash Area Landfill will also follow Construction Quality Assurance (CQA) procedures to ensure the final cover is designed, constructed, and installed in accordance with recognized standards and accepted good engineering practices as detailed in the following sections.

4.2 Final Cover and Subgrade Overview (§257.102(b)(1)(iii) and §257.102(d)(3)(i))

The final cover has been designed to meet the following objectives:

- Minimize the potential post-closure infiltration of liquids into the waste;
- Minimize the potential for releases of CCR material, leachate, or contaminated run-off to the ground or surface waters or the atmosphere;
- Provide long-term slope stability to prevent sloughing or movement of the final cover system during the closure and post-closure period; and
- Minimize the need for further maintenance of the CCR unit.

The final cover will be installed on top of a minimum of a 12-inch subgrade layer of compacted and graded fly ash. The top slope of the final cover for the Fly Ash Area Landfill will be a minimum of one percent from an approximate elevation of 1,230 ft MSL, with the exterior slopes constructed at a 3H:1V slope towards Tower Hill Lake. The positive drainage will minimize the potential for the infiltration of liquids into the CCR material. The final cover of the Fly Ash Area Landfill will be constructed to the final grades depicted in **Figure 4**. The final cover is comprised of the following layers, from bottom to top:

- A minimum of 18-inch of compacted soil (or) 40-mil Liner Low Density Polyethylene (LLDPE) geomembrane (or equivalent), infiltration layer; and
- A minimum 6-inch vegetated, erosion control layer.

The final cover system will meet the requirements of §257.102(d)(3)(i) and have a minimum permeability of 1×10^{-5} cm/sec. An alternate final cover may be used in lieu of the final cover system described above depending on the availability of materials. In the event that an alternate liner system is considered in line with the CCR Rules, §257.102(d)(3)(ii) will be followed, KDHE will be notified, and appropriate permitting will be secured.



4.2.1 Low Permeability Subgrade Construction

Prior to construction of the final cover for the Fly Ash Area Landfill, a 12-inch subgrade area comprised of fly ash will be prepared and used to support the final cover system. The subgrade will be compacted, then graded with a bulldozer, and smoothed to ensure a uniform surface.

After the grading and completion of the subgrade, the area will be inspected to ensure the working surface is smooth and free from sharp objects or abrupt changes in grade, and proper sloping allowed for drainage. Upon inspection, the area will be surveyed on a minimum of a 100-foot grid prior to the commencement of the installation of the final cover.

4.2.2 Infiltration Layer

An 18-inch compacted soil layer or a 40-mil textured LLDPE geomembrane (or equivalent) may be installed at the Fly Ash Area Landfill to serve as the infiltration layer. This layer will prevent infiltration of moisture through the final cover into the CCR material.

A total of approximately 216,457 cy of soil for the 18-inch compacted soil layer will be required, if used. The infiltration layer will be constructed from soil obtained from either local or on-site borrow sources and will be free of large particles or debris.

If the geomembrane is used, installation will follow the best practice procedures and in accordance with third-party conformance testing. Third-party conformance testing will be conducted on key parameters for the geomembrane material properties. Testing will be reported as part of the Construction Quality Assurance (CQA) for the Fly Ash Area Landfill.

4.2.3 Erosion Control Layer

The erosion control layer will include 6-inches of natural soils capable of sustaining vegetation. This layer will be located above the infiltration layer. Due to the Fly Ash Area Landfill being a current breeding and nesting habitat for the endangered Least Tern, the erosion control layer must be comprised of a suitable material for the habitat requirements of this bird.

The area within the boundary of the Least Tern habitat will not be vegetated, and will require approximately 27,830 cy of a suitable material for the erosion control layer. The area outside the current Least Tern habitat boundary will require 44,318 cy of soil. After placement, the soil outside the Least Tern habitat boundary will be seeded to promote the establishment of a healthy stand of grass and native vegetation. The vegetation will assist in limiting the infiltration of surface waters and effects of erosion on the final cover system.

The thickness of the erosion control soils will be verified by surveying the top of the layer in the same locations completed on the top of subgrade. The specified thicknesses of the layer are minimum thicknesses that will be developed in the field.



5.0 CONSTRUCTION CONSIDERATIONS

5.1 Equipment

Westar, or their contractor, is responsible for providing sufficient equipment to carry out Fly Ash Area Landfill closure operations, as designed, in a satisfactory manner. Equipment for Fly Ash Area Landfill closure operations may include any or all of the following, as described in Table 1, and potentially other equipment if deemed appropriate by Westar and their contractors:

TABLE 1: CONSTRUCTION EQUIPMENT	
EQUIPMENT	PURPOSE
Tracked Dozer	Spreading low permeability soil and protective or vegetative material
Excavators	Slope leveling near geomembrane tie-in at the waste boundary. Excavating soil material into haul trucks and final cover installation
Compactor	Compacting cohesive soil layer to achieve proper density
Haul Trucks	Haul cohesive soil and material into construction area
Drum Rollers	Preparing the low permeability soil layer top surface for geomembrane placement
Water Trucks	Spraying water on JEC roads for dust suppression

5.2 Phased Construction

The final cover will be placed progressively as each construction phase is complete. Construction of the cover system, haul road, and fill placement will take place throughout the year as needed, excluding the breeding season of the Least Tern. The objective will be to establish the stabilized final surface as efficiently as possible after the filling has been completed.

5.3 Stormwater Run-On and Run-Off Controls

A perimeter berm and/ or v-notch perimeter channel (stormwater controls) will prevent stormwater flow onto Fly Ash Area Landfill in order to comply with 40 CFR Part §257.81(a)(1). The stormwater controls will be modified such that there are no gaps that stormwater can pass through. The minimum height of the berm will be 1.3 feet and/or a v-



notch perimeter channel with 4H:1V side slopes, 2 foot depth running adjacent to the Landfill in order to prevent flow onto the Fly Ash Area Landfill. All stormwater features have been designed and will be constructed so as to convey run-on from a 25-year, 24-hour storm event.

In order to preclude the probability of water ponding on the compacted fly ash, the final grades and gentle slopes will be constructed to properly convey stormwater away from the Fly Ash Area Landfill. An alternative stormwater design may be utilized to convey run-off from Fly Ash Area Landfill for the 25-year, 24-hour storm event.

Tower Hill Lake is designed to serve as the stormwater run-off management system for the regional watershed, including the Fly Ash Area Landfill. Tower Hill Lake was designed to collect and control stormwater run-off from the regional subcatchment for a 25-year, 24-hour storm event.

Once the final cover installation/closure of the Fly Ash Area Landfill is completed, direct precipitation and non-contact stormwater run-off from the Fly Ash Area Landfill will drain to Tower Hill Lake, via gravity flow. Tower Hill Lake discharges into a tributary of the Kansas River. The outfall location at Tower Hill Lake is monitored to ensure that effluent limits meet the standards set by the NPDES Permit No. I-KS67-PO06 and 40 CFR Part §257.81(b). See the Run-on and Run-off Control Plan for further information on the stormwater controls.

5.4 Erosion Control

Erosion control measures such as riprap, erosion control blankets, and turf reinforcing mats will be used to minimize erosion of the perimeter berm. Other erosion control measures may include a relatively shallow slope of the plateau of the final cover and the use of the southern dike, both of which will control surface run-off rates on and around the Fly Ash Area Landfill. The vegetated areas outside the Least Tern habitat boundary will also assist in preventing erosion of the final cover soils. Construction of any erosion control measures including dikes and berms will take place as necessary and will be in accordance with the Run-on and Run-off Control Plan for the Fly Ash Area.

5.5 Stability

The final cover system may experience minor settlement over time relative to the base grade settlement due to waste consolidation. Only minimal waste consolidation is anticipated due to the physical characteristics of fly ash, the fly ash will be compacted during placement, and most of the settlement will have already occurred shortly after landfilling.

In the event future non-uniform settlement is observed to be impacting the functional design and/or operation of the Fly Ash Area Landfill and surrounding areas, minor regrading and repair of the soil or suitable material component may be required. The optional geomembrane and the compacted soil components are flexible and will retain their integrity under minor differential settlement.



6.0 OPERATIONS AND MAINTENANCE

The Least Terns prefer the Fly Ash Area Landfill because the fly ash resembles the material composition to their preferred nesting areas on the Kansas River sand and gravel bars. JEC operations have accommodated, as well as promoted, nesting and breeding of the Least Terns by re-routing fly ash disposal transport on the Fly Ash Area Landfill during their nesting season. The Least Tern habitat will be maintained when damage or distress to the final cover, cover soils, or fencing system are noted during the weekly inspections. Any detection will be repaired to maintain the erosion control measures and prevent a breach of the containment structures.

Following closure, the final cover will be maintained to prevent erosion and control excessive vegetative growth. Maintenance of the final cover will include periodic mowing of the vegetative cover and reseeding as necessary. The grass will be maintained at such a level as to facilitate inspection. This will help to discourage the inhabitation of burrowing animals. Mowing activities will be conducted on an as-need basis. The erosion control layer on the final cover system will be inspected, filled with soil, and regraded if the erosion channels are approximately 6-inches deep. Further details on the operations and maintenance are provided in the Post-Closure Plan for the Fly Ash Area.



7.0 CLOSURE PERFORMANCE STANDARDS (§257.102(d)(1))

7.1 Minimization of Liquid Infiltration into CCR Material Mass (§257.102(d)(1)(i))

As detailed above, the final cover system for the Fly Ash Area Landfill will include an infiltration layer, consisting of either compacted soils and/or a low-permeability geomembrane layer, and erosion control layer. The compacted soils and/or geomembrane will help to minimize the potential infiltration of water to the CCR material.

The final cover system will assist in preventing the contact between the surface water and the CCR material. This will minimize the movement of potentially contaminated water to ground or surface water systems. Additionally, it will assist in controlling, minimizing and in some cases eliminating, to the maximum extent feasible, post-closure infiltration of liquids into the waste, and the potential release of CCR material and leachate, as required by the performance standards.

7.2 Preclusion of Future Impoundment of Water, Sediment, or Slurry (§257.102(d)(1)(ii))

Westar does not intend the need for future impoundment of water, sediment, or slurry within the Fly Ash Area Landfill once the final cover system is installed. Therefore, the Fly Ash Area Landfill follows the required performance standards.

7.3 Measures to Maintain Slope Stability (§257.102(d)(1)(iii))

In order to maintain slope stability of the final cover, run-off is collected and controlled in highly erodible areas such as the side slopes and graded surface. This is done by grading the Fly Ash Area Landfill area to a maximum slope of 3H:1V, with a gentle final grade to control slope run-off velocities and volumes.

The run-off controls and shallow slopes prevent erosion, movement, and sloughing of the final cover system, as required by the performance standards. Further details on stormwater run-on and run-off control for the Fly Ash Area are provided in the Run-On and Run-Off Control Plan.

7.4 Design to Minimize Ongoing Maintenance (§257.102(d)(1)(iv))

The incorporation of slope stability and erosion control measures will minimize the need for on-going maintenance on the Fly Ash Area Landfill. The weekly inspections will assist in identifying maintenance at the earliest opportunity, so as to prevent larger maintenance requirements in the future.

Both the preventative maintenance measures in addition to the weekly inspections will minimize the requirement for larger maintenance of the Fly Ash Area Landfill, and therefore fulfills the required performance standards.



7.5 Engineering Good Practices (§257.102(d)(1)(v))

The planned quick completion and phasing of final cover operations will prevent large amounts of contact water from being generated. The use of time efficiency with a high standard for quality is an example of a good engineering practice and satisfaction of the required performance standards.



8.0 CLOSURE ACTIVITY SCHEDULE (§257.102(b)(1)(vi))

The closure of the Fly Ash Area Landfill will be completed according to the following schedule milestones:

- Based on Section 3.5, it can be seen that the estimated closure date of the Fly Ash Area Landfill will be in 2027. As the Fly Ash Area Landfill is filled this date may change depending on the rates of disposed fly ash. This closure date will be updated accordingly as required, as part of an amendment to this Plan.
- Notify KDHE in writing at least 60 days before closure.
- Notify and submit required Action Permit Application to the Kansas Department of Wildlife, Parks and Tourism, Ecological Services Section no later than 45 days before closure.
- The final cover installation will be initiated as soon as possible after regulatory approval, in line with both suitable weather for construction and breeding and nesting requirements of the Least Tern. It is therefore anticipated that construction of the final cover will be undertaken following the nesting season in August.
- Construction and analytical testing will be conducted in systematic and timely manner. Delays will be avoided in completion. Construction and testing of the soil will generally not exceed 60 working days from beginning to completion.
- Commence closure of the Area, by following §257.102(e)(3), no later than 30 days after the date on which the CCR unit receives the final receipt of fly ash, per §257.102(e)(1).
- Completion of closure activities will occur within six months of commencing closure activities as required by §257.102(f)(1). Upon completion a certified Kansas Professional Engineer will provide KDHE with a closure certification. This will verify that the Fly Ash Area Landfill closure was performed and completed in accordance with the closure plan. A request for an extension of the closure timeframe may be submitted following the guidelines in §257.102(f)(2)(i-iii).
- Within 30 days of the completion of closure of the CCR unit, the notification of closure of the CCR unit will be submitted as per §257.102(h).
- Post-closure monitoring of the cap and run-on/run-off controls will be conducted on a routine schedule to identify any potential stability issues with the cap and appropriate maintenance to be undertaken. A post-closure monitoring plan for the Fly Ash Area Landfill has been detailed in the Post-Closure Plan for the Fly Ash Area.



9.0 RECORD KEEPING/NOTIFICATION REQUIREMENTS (§257.102(j))

Per §257.102(j), Westar maintains an operating record consisting of the following documents specified in §257.105(i):

- Inspection records that are conducted for the disposal of materials;
- Groundwater sampling and analysis results for the Fly Ash Area Landfill, records of by-product material recycled, major operational problems, complaints or difficulties, records associated with corrective measures, and employee training records;
- A copy of the SWPPP and the SWPPP Record Forms;
- The Plan, as required by §257.102(b)(2)(iii), the Post-Closure Plan, as well as closure CQA certification and post-closure inspection documentation;
- Proof of financial insurance;
- A copy of the current operating permit and any subsequent addenda; and
- Copies of the permit applications and all supporting documents.

Additionally as per §257.104(f), Westar will comply with the notification requirements specified in §257.106(i). This includes submitting the following notification documents and any amendments to these documents to the state director:

- Intent to initiate closure;
- Availability of annual progress reports of closure implementation;
- Closure and Post-Closure Plan and any alternative closure requirements;
- Any required time extensions;
- Completion of closure of a CCR unit;
- Deed notation;

Internet requirements specified in §257.107(i) will be placed on owner and operators publicly accessible website, as per §257.104(f). These documents include any notification on the closure or post-closure intent or completion, annual progress reports, the written Closure and Post-Closure Plans and any amendments, demonstrations for time extensions, and the record of the deed.

All records that are relevant within the past five years will be maintained at JEC and/or by Westar. The records are available to KDHE representatives for review upon request.

9.1 Plan Amendments (§257.102(b)(3))

This Plan will continue to undergo review as the Fly Ash Area Landfill continues phased construction activities. The amended Plan will be reviewed and recertified by a registered



professional engineer and will be placed in JEC's facility operating record as required per §257.105(i)(4). The amended Plan will supersede and replace any prior versions. Availability of the amended Plan will be noticed to the State Director per §257.106(i) and posted to the publicly accessible internet site per §257.107(i).

A record of Plan reviews/assessments is provided on the first page of this document, immediately following the Table of Contents. Any subsequent amendment of a written Plan will be prepared as required, such as:

- There is a change in the operation of the CCR unit that would substantially affect the written Plan in effect; or
- Before or after closure activities have commenced, unanticipated events necessitate a revision of the written Plan.

The owner or operator will amend the Plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written Plan. If a written Plan is revised after closure activities have commenced for a CCR unit, the owner or operator will amend the Plan no later than 30 days following the triggering event.

9.2 Amended Plan Certification (§257.102(b)(4))

CB&I reviewed any previously developed closure information/plans which exist for the Fly Ash Area Landfill. CB&I prepared a Plan for the Fly Ash Area Landfill to address closure with CCR materials left in place. CB&I has utilized the existing Plans in this report to minimize costs associated with development of these Plans.

This Plan will continue to undergo review as the Fly Ash Area Landfill continues phased construction activities. Any future amendments to the current Plan will be tracked in the log at the beginning of this document and will be certified by a qualified professional engineer that the amended Plan meets the requirements of the applicable portions of the CCR Rule. The amended Plan will be placed in JEC's facility operating record per §257.105(i)(4), noticed to the State Director per §257.106(i) and posted to the publicly accessible internet site per §257.107(i)

9.3 Notice of Intent to Initiate Closure (§257.102(g))

Westar will file a Notice of Intent of closure activities no later than the date of initiation of closure of the Fly Ash Area Landfill. The notification will include the certification by a registered professional engineer in the State of Kansas, for the design of the final cover system as required by §257.102(d)(3)(iii).

If required, Westar may request an extension of an additional two years to initiate closure of the Fly Ash Area Landfill, and provide written documentation that the Fly Ash Area Landfill will continue to accept waste or will start removing CCR material for the purpose of beneficial use. The documentation to extend the closure of an idle CCR unit must be supported by specific information specified in the CCR Rule, §257.102(e)(2)(ii)(A-B). The factors that may support such a demonstration are not included in the current Plan at this time. If such an extension is needed in the future, the plan will be amended to address this issue at a later date.



9.4 Notice of Completion of Closure (§257.102(h))

Westar will complete a Notice of Completion of closure activities within 30 (thirty) days of completion of closure of the Fly Ash Area Landfill. The notification will include the certification by a registered professional engineer as required by §257.102(f)(3).

9.5 Deed Notation (§257.102(i))

Per §257.102(i), a notation on the deed to the property, or some other instrument, that is normally examined during a title search will be recorded to notify any potential purchaser of the property that the land has been used as a CCR unit and its use is restricted under the post-closure care requirements provided within §257.104(d)(1)(iii). The following information will be recorded in accordance with the CCR Rule:

- The name and address of the person with knowledge of the contents of the Fly Ash Area Landfill
- The prior land use as a CCR unit
- The restrictions of future land use under the post-closure care requirements



10.0 CLOSURE COST ESTIMATE

The combined closure cost for the Fly Ash Area Landfill is estimated to be approximately \$1,582,542.77, as of October 2016. This includes preparing the site for construction of the final cover, the cost of the actual final cover, the implementation of erosion control measures, and possible reclamation costs. The maximum closure cost estimates when operating the Fly Ash Area Landfill can be found in **Appendix A**.

In providing these cost estimates, it is recognized that Westar does not have control over the costs of labor, equipment, or materials, or over a contractor's method(s) of determining prices or bidding.



11.0 PROFESSIONAL ENGINEER CERTIFICATION (§257.102(d)(3)(iii)).

The undersigned registered professional engineer is familiar with the requirements of §257.102 of the CCR Rule and has visited and examined the JEC or has supervised examination of the JEC by appropriately qualified personnel. The undersigned registered professional engineer attests that this CCR Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and meets the requirements of §257.102, and that this Plan is adequate for JEC's facility. This certification was prepared as required by §257.102(d)(3)(iii).

Name of Professional Engineer: Richard Southorn

Company: CB&I

Signature: 

Date: 10/13/16

PE Registration State: Kansas

PE Registration Number: PE25201

Professional Engineer Seal:



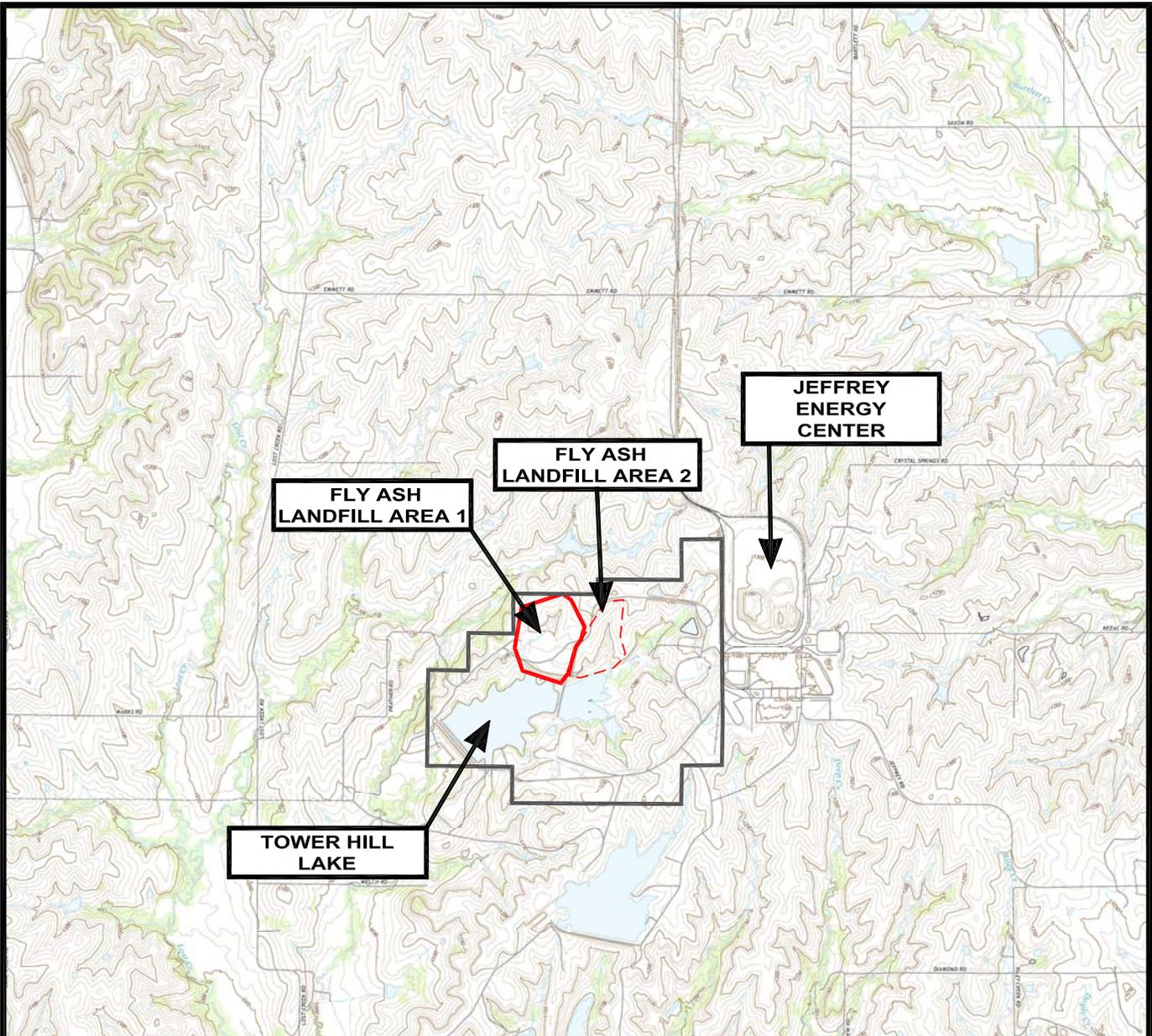
FIGURES

Figure 1 – Fly Ash Area, Site Location Plan

Figure 2 – Fly Ash Area 1, Existing Site Topography

Figure 3 – Fly Ash Area 1, Current Least Tern Boundary Location

Figure 4 – Fly Ash Area 1, Permitted Final Landform

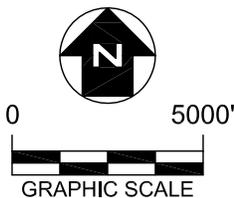


LEGEND

-  CCR UNIT BOUNDARY
-  PROPOSED CCR UNIT BOUNDARY
-  APPROXIMATE KDHE-BWM INDUSTRIAL LANDFILL PERMIT NO. 0359 BOUNDARY

NOTES

1. AERIAL TOPO OBTAINED FROM USGS 7.5-MINUTE SERIES, EMMETT AND LACLEDE QUADRANGLE, KANSAS, 2014.
2. ALL BOUNDARIES ARE APPROXIMATE.



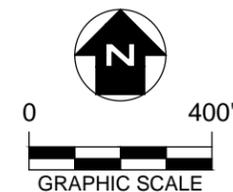
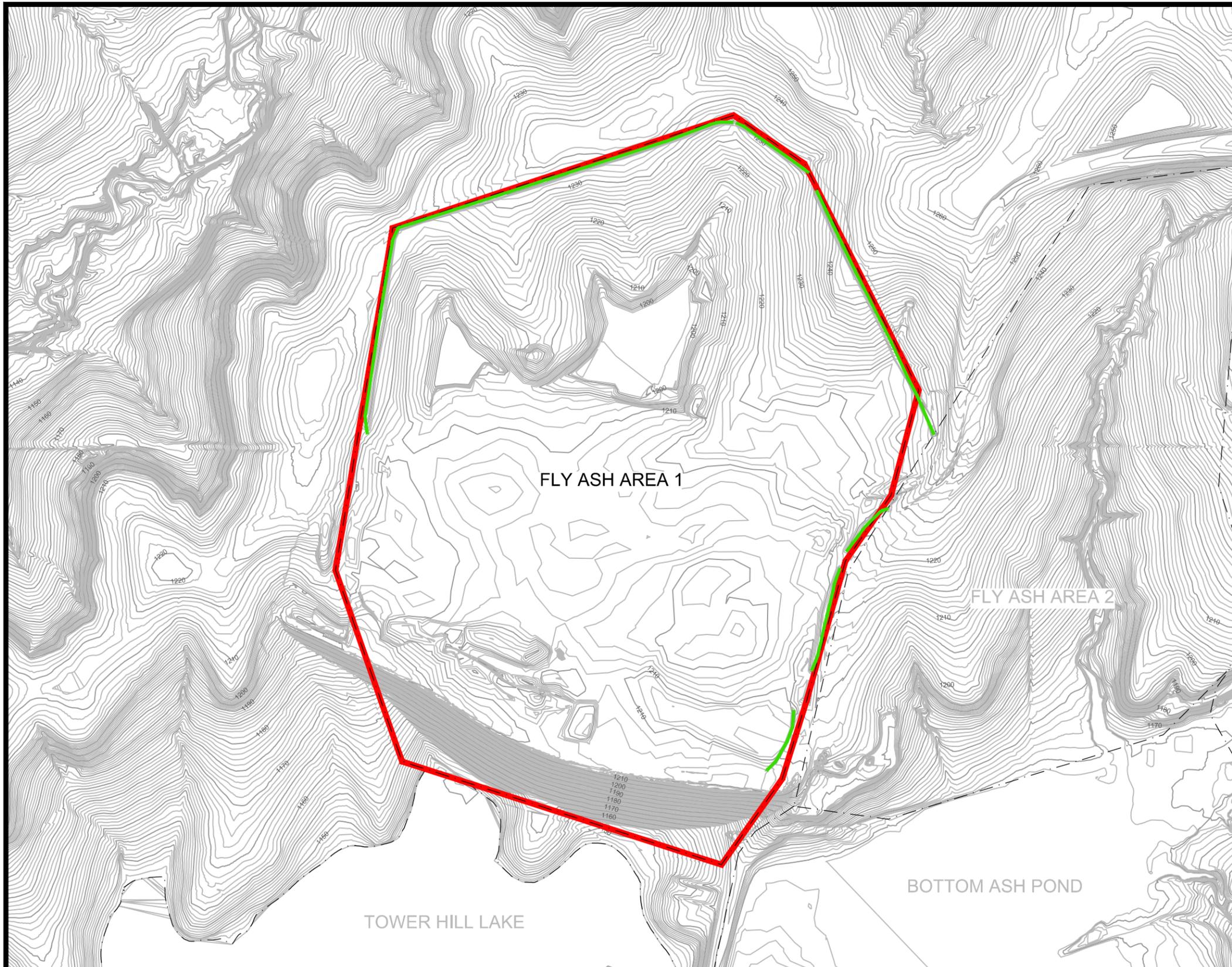
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**WESTAR ENERGY
25905 JEFFREY RD., ST. MARYS, KS**

**FIGURE 1
FLY ASH AREA
SITE LOCATION PLAN**

APPROVED BY: MMS | PROJ. NO.: 631214397 | DATE: OCTOBER 2016



LEGEND

- CCR UNIT BOUNDARY
- EXISTING PERIMETER BERM

NOTES

1. EXISTING CONTOURS DEVELOPED BY PEC IN APRIL 2016.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. FLY ASH AREA 1 BOUNDARY IS APPROX. 98.8 ACRES.
4. ALL BOUNDARIES ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION



CB&I Environmental & Infrastructure, Inc.

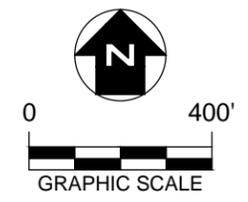
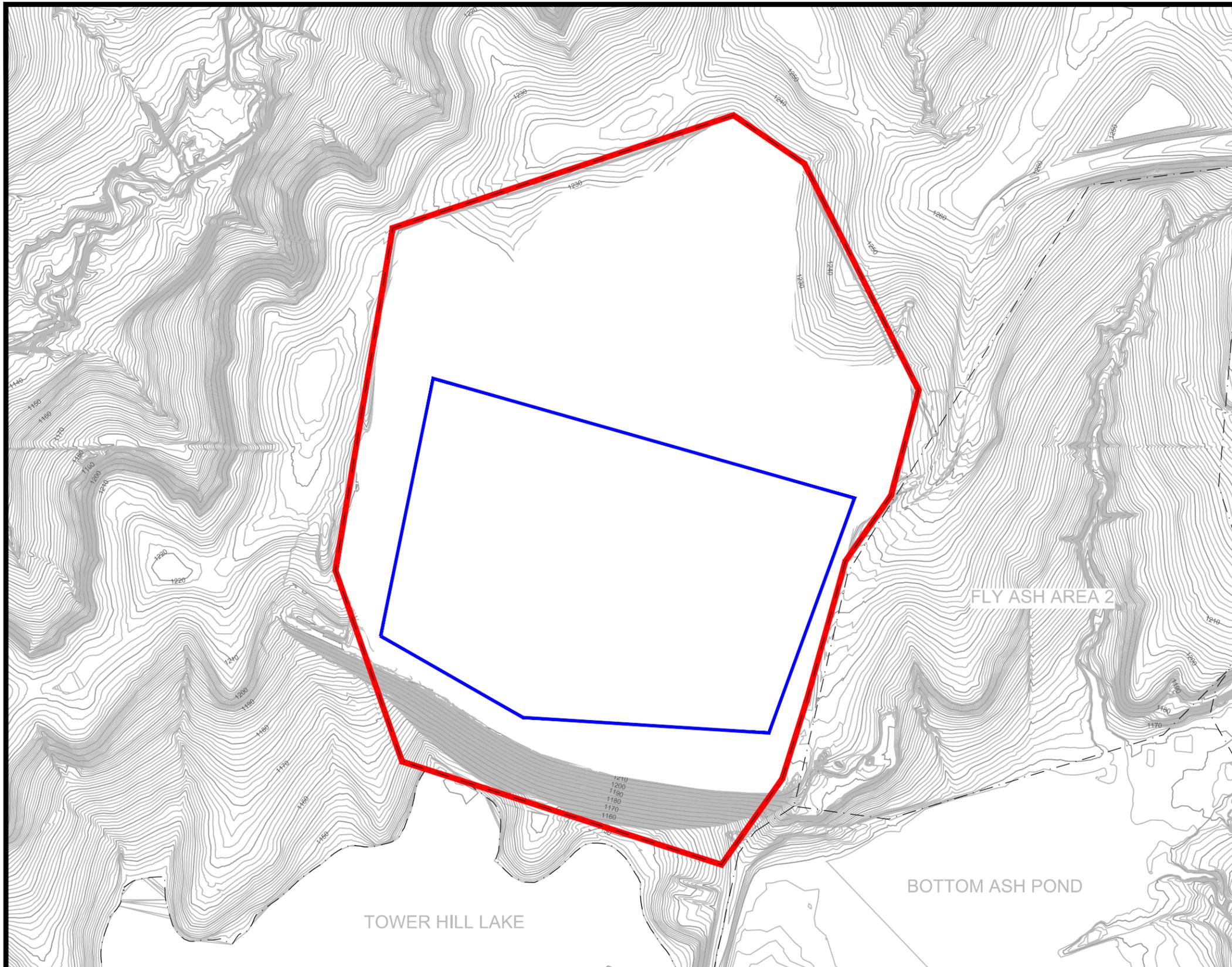
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FIGURE 2
FLY ASH AREA 1
EXISTING SITE TOPOGRAPHY

DRAWN BY: NV	APPROVED BY: MMS	PROJ. NO.: 631214397	DATE: OCTOBER 2016
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LEGEND

- FLY ASH AREA 1 BOUNDARY
- LEAST TERN HABITAT FENCING (BASED ON CURRENT BREEDING LOCATIONS)

NOTES

1. EXISTING CONTOURS DEVELOPED BY PEC IN APRIL 2016.
2. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
3. FENCE BOUNDARY BASED ON 2015 INTERIOR LEAST TERN NESTS MAP FOR JEFFREY ENERGY CENTER, U.S. FISH AND WILDLIFE SERVICES, 2015.
4. FLY ASH AREA 1 BOUNDARY IS APPROX. 98.8 ACRES.
5. LEAST TERN HABITAT IS APPROX. 34.5 ACRES.
6. ALL BOUNDARIES ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION

CBI Environmental & Infrastructure, Inc.

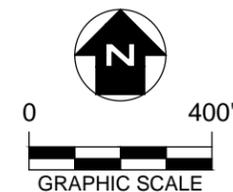
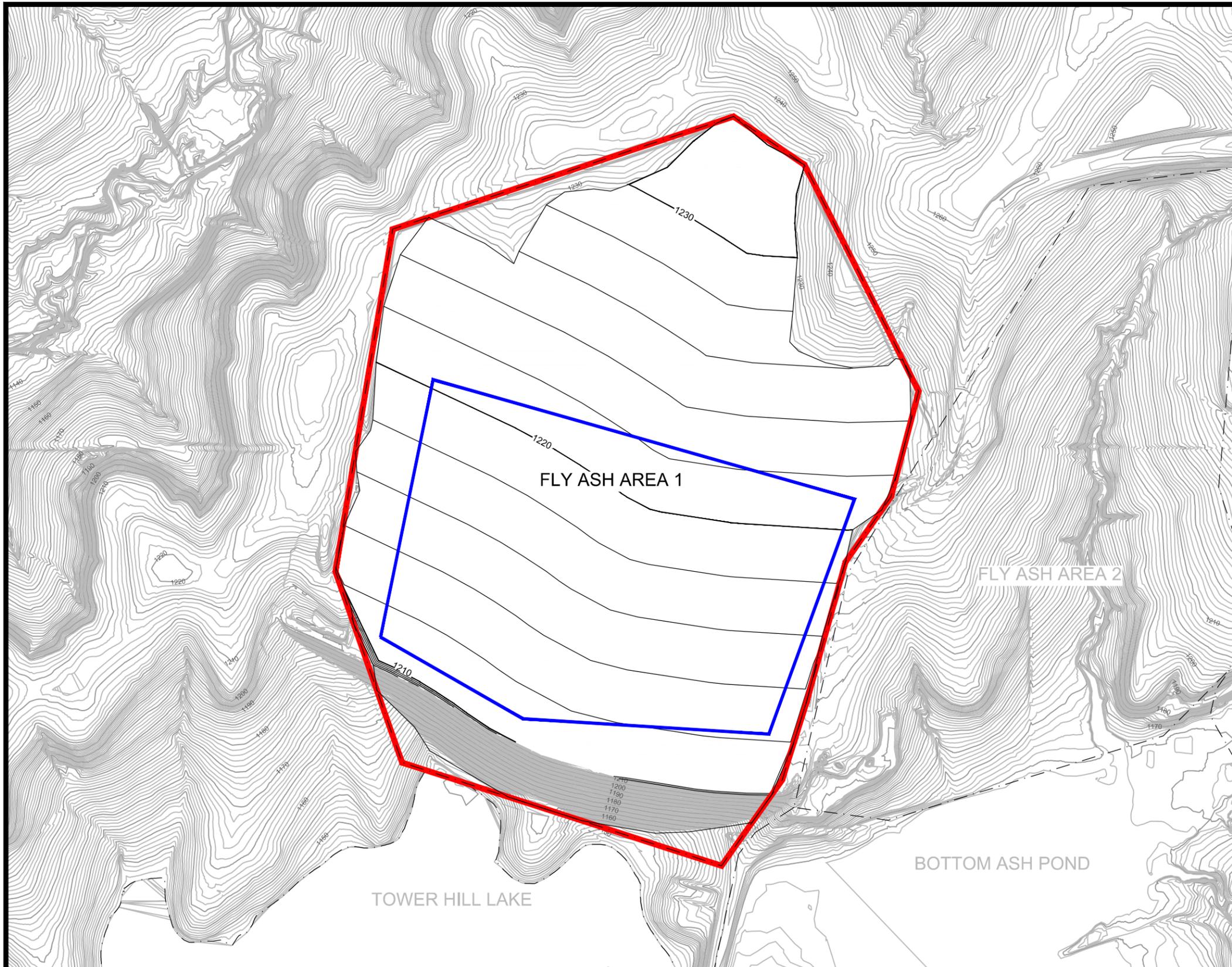
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WESTAR ENERGY
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FIGURE 3
FLY ASH AREA 1
CURRENT LEAST TERN BOUNDARY FENCE LOCATION

DRAWN BY:	ORC	APPROVED BY:	MMS	PROJ. NO.:	631214397	DATE:	OCTOBER 2016
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LEGEND

- CCR UNIT BOUNDARY
- EXISTING SITE CONTOUR
- PERMITTED SITE CONTOUR
- LEAST TERN HABITAT FENCING (BASED ON CURRENT BREEDING LOCATIONS)

NOTES

1. EXISTING CONTOURS DEVELOPED BY PEC IN APRIL 2016.
2. FINAL GRADES WERE TAKEN FROM KDHE-BWM INDUSTRIAL LANDFILL PERMIT NO. 0359.
3. FENCE BOUNDARY BASED ON 2015 INTERIOR LEAST TERN NESTS MAP FOR JEFFREY ENERGY CENTER, U.S. FISH AND WILDLIFE SERVICES, 2015.
4. FLY ASH AREA 1 BOUNDARY IS APPROX. 98.8 ACRES.
5. LEAST TERN HABITAT IS APPROX. 34.5 ACRES.
6. ALL BOUNDARIES ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION



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**FIGURE 4
FLY ASH AREA 1
PERMITTED FINAL LANDFORM**

DRAWN BY: NV APPROVED BY: MMS PROJ. NO.: 631214397 DATE: OCTOBER 2016

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APPENDICES

APPENDIX A

Closure Cost Estimate

Landfill Closure - 2016 Annual Cost Estimate Worksheet - Kansas Department of Health & Environment

OWNER: <u>Westar Energy, Inc.</u>	PERMIT No.: <u>359</u>
OPERATOR: <u>Westar Energy, Inc.</u>	ESTIMATOR: <u>CB&I Environmental & Infrastructure</u> DATE: <u>October 2016</u>
TOTAL PERMITTED WASTE DISPOSAL <u>98.77</u> ACRES	Closure Plan Title: <u>Jeffrey Energy Center Fly Ash Area 1 Closure</u> Last Revision Date: _____
TOTAL PERMITTED AREA CERTIFIED CLOSED: <u>0</u> ACRES	ACRES CURRENTLY OPEN: <u>98.8</u> (i.e., "open" means areas subject to regulation and have not been certified closed)
LARGEST ACREAGE REQUIRING FINAL COVER DURING THE RENEWAL PERIOD: <u>98.77</u>	
LANDFILL TYPE: _____ SUBTITLE D MUNICIPAL SOLID WASTE _____ SMALL ARID MUNICIPAL SOLID WASTE <input checked="" type="checkbox"/> INDUSTRIAL WASTE _____ CONSTRUCTION & DEMOLITION WASTE _____ WASTE TIRE MONOFILL	

LANDFILL CLOSURE - 2016 ANNUAL COST ESTIMATE WORKSHEET Permit No.:

	ITEM	QUANTITY	UNITS	UNIT COST	COST	SUBTOTALS	SOURCE OF UNIT COST INFO or NA
1.0.0	PREPARING SITE FOR CONSTRUCTION OF FINAL COVER						
1.0.1	Backfill below grade areas with structural backfill		CU. YD.		\$0.00		NA - No backfill needed, area will be graded prior to cap placement
1.0.2	Construct sump and install pump(s) for perpetual pumping	1	Lump Sum		\$0.00		NA
1.0.3	Other: Provide design and itemize		Acre		\$0.00		NA
1.0.4	Preparing Site for Construction of Final Cover Subtotal					\$0.00	
2.0.0	FINAL COVER						
2.0.1	Low Permeability Soil Layer						
2.0.2	Complete soil contouring and grading for final cover	98.8	ACRE	\$2,500.00	\$247,000.00		Grade fly ash and prepare area for final cover placement. 2016 RS Means update.
2.0.3	Clay, On-Site (excavate, transport, place, compact) (Quantity must match earthwork balance and must be guaranteed for future availability)	131,648	CU. YD.	\$4.25	\$559,504.00		18" compacted clay final cover for 54.4 acres active area (131,648 yd3) from on-site borrow source
2.0.4	Clay, Off-site (excavate, transport, place, compact) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA
2.0.5	Low Permeability Soil Layer Subtotal					\$806,504.00	
3.0.0	Geomembrane and Drainage Layer						
3.0.1	Drainage material--sand		CU. YD.		\$0.00		NA
3.0.2	Drainage material--geogrid		SQ. YD.		\$0.00		NA
3.0.3	Geomembrane		SQ. YD.		\$0.00		NA
3.0.4	Geomembrane and Drainage Layer Subtotal					\$0.00	
4.0.0	Protective Soil and Vegetative Layer						
4.0.1	Protective Soil, On-site (excavate, transport, place, compact) (Quantity must match earthwork balance and must be guaranteed for future availability)	0	CU. YD.	\$4.75	\$0.00		
4.0.2	Protective Soil, Off-site (excavate, transport, place, compact) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA
4.0.3	Vegetative Soil (Topsoil), On-site (excavate, transport, place) (Quantity must match earthwork balance and must be guaranteed for future availability)	43,883	CU. YD.	\$4.25	\$186,502.75		6" erosion control/ vegetative layer for fly ash landfill for 54.4 acre active area (43,883 yd3) assuming \$2.25 per cubic yard for placement and compaction plus \$2.50 per cubic yard for excavation and transportation for total unit cost of \$4.75 per cubic yard
4.0.4	Vegetative Soil (Topsoil), Off-site (excavate, transport, place) (Quantity must match earthwork balance)		CU. YD.		\$0.00		NA
4.0.5	Seeding and mulching	54.4	ACRE	\$1,200.00	\$65,280.00		Area disturbed from new placement of final cover (54 acres)

4.0.6	Fertilizer	54.4	ACRE	\$272.00	\$14,796.80		Fertilize reseeded area
4.0.7	Protective Soil and Vegetative Layer Subtotal					\$266,579.55	
5.0.0	EROSION CONTROL						
5.0.1	Terraces and letdowns		Lin. FT.		\$0.00		NA
5.0.2	Checkdams and filters	9300	Lin. FT.	\$1.00	\$9,300.00		Silt fence to minimize sediment loss from disturbed area and borrow area.
5.0.3	Grass ditching/channels		Lin. FT.		\$0.00		NA
5.0.4	Riprap ditching/channels		Lin. FT.		\$0.00		NA
5.0.5	Erosion Control Subtotal					\$9,300.00	
6.0.0	GAS SYSTEM						
6.0.1	Gas vents, _____ # of vents, _____ average depth		Lin. FT.		\$0.00		NA
6.0.2	Passive System						
6.0.3	Passive well head flare		EACH		\$0.00		NA
6.0.4	Active System						
6.0.5	Flare, _____ BTU/hour		EACH		\$0.00		NA
6.0.6	Additional Well Installation		EACH		\$0.00		NA
6.0.7	Ancillary gas equipment (piping, blowers, condensate collection)	1	Lump Sum		\$0.00		NA
6.0.8	Gas System Subtotal					\$0.00	
7.0.0	GROUNDWATER MONITORING SYSTEM (applies to municipal solid waste, industrial, and some construction & demolition landfills; see instructions)						
7.0.1	Well installation		EACH		\$0.00		NA - to be addressed in Post-Closure Plan
7.0.2	Abandon & plug wells		EACH		\$0.00		NA
7.0.3	Upgrade or repair existing wells		EACH		\$0.00		NA
7.0.4	Dedicated pump/sampling system installation/upgrade		EACH		\$0.00		NA
7.0.5	Sample collection (2 events per year, _____ 4 _____ wells sampled per event)		EVENT		\$0.00		NA
7.0.6	Sample analysis and reporting (2 events per year, _____ 4 _____ wells sampled per event))		EVENT		\$0.00		NA
7.0.7	Groundwater Monitoring System Subtotal					\$0.00	
8.0.0	LEACHATE COLLECTION SYSTEM						
8.0.1	Additional/upgrades for collection piping		Lin. FT		\$0.00		NA
8.0.2	Additional/upgrades to pumps		EACH		\$0.00		NA
8.0.3	Additional/upgrades to storage containers		EACH		\$0.00		NA
8.0.4	Baseline sample collection		EACH		\$0.00		NA
8.0.5	Baseline sample analysis and reporting		EACH		\$0.00		NA
8.0.6	Leachate Collection System Subtotal					\$0.00	
9.0.0	OPERATIONS AND INVENTORY REMOVAL						
9.0.1	Excess solid waste		CU. YD.		\$0.00		NA
9.0.2	Mobile equipment/machinery (e.g., containers, tanks, etc...)	1	Lump Sum		\$0.00		NA
9.0.3	Stored leachate		GAL.		\$0.00		NA
9.0.4	Contaminated soils		CU. YD.		\$0.00		NA
9.0.5	Operations and Inventory Removal Subtotal					\$0.00	
10.0.0	DEMOLITION/REMOVAL SITE IMPROVEMENTS						
10.0.1	Office/shop/maintenance and other ancillary buildings	1	Lump Sum		\$0.00		NA
10.0.2	Equipment to be decommissioned (e.g., weigh scales, bulking/solidification pits, collection pits/sumps, piping, etc...)	1	Lump Sum		\$0.00		NA
10.0.3	Site Utilities	1	Lump Sum		\$0.00		NA
10.0.4	Demolition/Removal Site Improvements Subtotal					\$0.00	
11.0.0	REPLACE/REBUILD SITE ACCESS CONTROLS						
11.0.1	Fencing		Lin. FT.		\$0.00		NA
11.0.2	Gates		EACH		\$0.00		NA

11.0.3	Access barriers		EACH		\$0.00		NA
11.0.4	Other security equipment	1	Lump Sum		\$0.00		NA
11.0.5	Replace/Rebuild Site Access Controls Subtotal					\$0.00	
12.0.0	BORROW AREA RECLAMATION						
12.0.1	Grading and site preparation	12	ACRE	\$2,000.00	\$24,000.00		Assume 20' of excavation, required area for Borrow Site 1 is approximately 6 acres
12.0.2	Soil, On-site (excavate, transport, place, compact)		CU.YD.		\$0.00		NA
12.0.3	Soil, Off-site (excavate, transport, place, compact)		CU. YD.		\$0.00		NA
12.0.4	Seeding and mulching	12	ACRE	\$1,200.00	\$14,400.00		Area disturbed from material excavation
12.0.5	Fertilizer	12	ACRE	\$272.00	\$3,264.00		Fertilize reseeded area
12.0.6	Borrow Area Reclamation Subtotal					\$41,664.00	
13.0.0	Closure Cost Subtotal					\$1,124,047.55	
14.0.0	PROFESSIONAL SERVICES [Closure cost subtotal (13.0.0) X 12% or enter costs provided by third party with sources listed in line items below]						
14.0.1	Professional Services (12% of Closure Cost Subtotal)				\$134,885.71		
14.0.2	Topographic and Boundary Survey	1	Lump Sum	\$98,800.00	\$98,800.00		Topo survey of final cover placement area; assuming \$1000 per acre for 98.8 acres; 2016 RS means
14.0.3	Engineering (Design, Bid Documents, Procurement, Construction Contract Management)	1	Lump Sum		\$0.00		
14.0.4	Engineering Services, (Construction Oversight, Testing, Reporting, Certification)	1	Lump Sum		\$0.00		
14.0.5	Professional Services Subtotal					\$233,685.71	
15.0.0	ADMINISTRATION AND CONTINGENCY						
15.0.1	Administration Services (Closure Cost Subtotal [13.0.0] x 10%)				\$112,404.76		
15.0.2	Contingency (Closure Cost Subtotal [13.0.0] x 10%)				\$112,404.76		
15.0.3	Administration and Contingency Subtotal					\$224,809.51	
(2016)TOTAL CURRENT CLOSURE COST					\$1,582,542.77	Adjusted October 2016 for the opening of the remaining fly ash area 1 acerage.	
(2017)TOTAL CURRENT CLOSURE COST					\$1,630,019.05	2016 Total Closure Cost plus 3% per KDHE guidance	

Estimator: _____

(Printed Name)

(Signature)

Date: _____