

**2016 ANNUAL CCR UNIT INSPECTION REPORT
LUMINANT – MARTIN LAKE STEAM ELECTRIC STATION
A-1 AREA LANDFILL
PANOLA COUNTY, TEXAS**

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Luminant

1.0 INTRODUCTION

Luminant Generation Company LLC (Luminant) operates the Martin Lake Steam Electric Station (MLSES) located approximately five miles southwest of Tatum in Rusk County, Texas. The power plant and related support areas occupy approximately 700 acres on a peninsula on the southwest side of Martin Lake (see Figure 1). The MLSES consists of three coal/lignite-fired units with a combined operating capacity of approximately 2,250 megawatts. Coal Combustion Residuals (CCR) including fly ash, bottom ash, gypsum are generated as part of MLSES unit operation. The CCRs are transported off-site for beneficial use by third-parties, are managed by Luminant on-site at Permanent Disposal Pond No. 5 (PDP-5), or are disposed at Luminant's A-1 Area Landfill. The A-1 Landfill is located approximately 2.5 miles southeast of the MLSES in Panola County.

The CCR Rule (40 CFR 257 Subpart D - *Standards for the Receipt of Coal Combustion Residuals in Landfills and Surface Impoundments*) has been promulgated by EPA to regulate the management and disposal of CCRs as solid waste under Resource Conservation and Recovery Act (RCRA) Subtitle D. The final CCR Rule was published in the Federal Register on April 17, 2015. The effective date of the CCR Rule was October 19, 2015.

The CCR Rule establishes operating criteria for existing CCR surface impoundments and landfills, including annual inspection requirements for all CCR units to ensure that the design, construction, operation, and maintenance of the CCR impoundment are consistent with recognized and generally accepted good engineering standards. Pastor, Behling & Wheeler, LLC (PBW) was retained by Luminant to perform the 2016 annual inspection of the CCR units at the MLSES. This report presents the findings of the 2016 annual inspection.

1.1 MLSES Units Subject to Annual CCR Inspection Requirements

The CCR Rule defines coal combustion residuals such as fly ash, bottom ash, boiler slag, flue gas desulfurization (FGD) materials (gypsum), and related solids generated from burning coal for the purpose of generating electricity by electric utilities and independent power producers. The annual inspection requirements of the CCR Rule apply to surface impoundments and landfills that dispose or otherwise engage in solid waste management of CCRs.

A site plan for the MLSES is shown on Figure 2. The following surface impoundments and landfills at the MLSES have been identified as CCR Units:

- West Ash Pond (WAP),
- East Ash Pond (EAP),
- New Scrubber Pond (SP),
- PDP-5, and
- A-1 Area Landfill.

The CCR Unit applicable to this report is described in greater detail below:

- A-1 Area Landfill. The A-1 Area Landfill is located approximately 2.5 miles southeast of the MLSES power plant (Figure 2). The A-1 Area Landfill is the primary disposal facility for CCRs generated at the MLSES. The landfill covers an area of approximately 986 acres and is located within a reclaimed section of the Luminant Beckville Mine. The A-1 Area Landfill is surrounded by and underlain by spoil material that was previously excavated during lignite mining operations. The A-1 Area Landfill is registered under the Texas Commission on Environmental Quality and began receiving CCR in 1980.

The A-1 Area Landfill is surrounded by earthen embankments constructed of mine spoil. Prior to placement of CCRs, a 1-foot thick compacted clay bottom liner is constructed over prepared subgrade (mine spoil 70-100 feet in thickness). Hence, the bottom liner consists of clay scarified and re-compacted to achieve the design specification of 95 percent of maximum density and an in-place permeability of 1×10^{-7} cm/sec or less. Specifications for the construction of the perimeter embankments include placement of a 3-foot thick compacted clay liner on the interior slope of the embankment, which was specified not to exceed a 3:1 (horizontal:vertical) sideslope. Approximately 450-acres of the A-1 Area landfill has been closed by placement of a 3-foot thick compacted clay cap with a minimum 2-foot thick vegetative cover layer. Progressive capping/closure of the A-1 Area Landfill is performed as placement of CCR reaches the target cap subgrade elevations.

A number of former drainage control valves and active pond discharge control pipes that penetrate the perimeter embankment of the A-1 Area Landfill remain in-place.

1.2 Annual CCR Surface Impoundment Inspection Requirements

Section 257.83(b) of the CCR Rule specifies that annual inspections by a qualified professional engineer be performed for each CCR surface impoundment that: (1) has a dike height of five feet or more and a storage volume of 20 acre-feet or more; or (2) has a dike height of 20 feet or more. Each of the MLSES CCR impoundments (WAP, EAP, SP and PDP-5) are surface impoundments surrounded by earthen embankments (dikes) with heights of five feet or more and the BAPs have a storage volume greater than 20 acre-feet. As a result, the each of the MLSES CCR impoundments are subject to the annual inspection requirements of Section 257.83(b) of the CCR Rule. The first annual CCR inspection for the BAPs was

performed in 2015 (PBW, 2016a).

In accordance with Section 257.83(b), a 2016 annual CCR inspection would be required for each of the CCR impoundments at MLSES; however, CCR Rule Section 257.83(b)(4)(ii) states the following regarding annual inspection requirements for surface impoundments:

*(ii) In any calendar year in which both the periodic inspection by a qualified professional engineer and the quinquennial (occurring every five years) structural stability assessment by a qualified professional engineer required by Sections 257.73(d) and 257.74(d) are required to be completed, **the annual inspection is not required**, provided the structural stability assessment is completed during the calendar year...*

A five-year structural stability assessment was performed for the WAP, EAP, SP and PDP-5 during 2016 by Golder Associates as required under CCR Rule Section 257.73(d) (Golder, 2016). Since the five-year structural stability assessment was performed for the CCR surface impoundment during 2016, a 2016 annual inspection **is not** required for the WAP, EAP, SP or PDP-5 under CCR Rule Section 257.83(b)(4)(ii). The next annual inspection of the MLSES CCR surface impoundments will be performed in 2017.

1.3 Annual CCR Landfill Inspection Requirements

Section 257.84(b) of the CCR Rule specifies that annual inspections be performed for CCR landfills by a qualified professional engineer. The annual CCR landfill inspection must include a review of available information regarding the status and condition of the CCR landfill including files available in the operating record, such as the results of inspections by the qualified person as required under Section 257.84(a), and the results of previous annual CCR inspections (where applicable) and visual inspection of the CCR landfill to identify signs of distress or malfunction of the landfill. The qualified professional engineer must prepare a report following each inspection that addresses the following:

- Any changes in geometry of the structure since the previous annual inspection;
- The approximate volume of CCR in the landfill at the time of the inspection;
- Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and
- Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.

A-1 Area Landfill is classified as an Existing CCR Landfill under the CCR Rule and is therefore subject to the annual inspection requirements of Section 257.84(b). The first annual CCR inspection for A-1 Area Landfill was performed in 2015 (PBW, 2016a).

2.0 RECORDS REVIEW

In accordance with the requirements of 40 CFR Parts 257.83(b)(i) and 257.84(b)(i), Luminant provided PBW with the following information from the facility operating records for the CCR units at the MLSES:

- Fugitive Dust Control Plan (FDCP) for the CCR units,
- weekly qualified person inspection records for the CCR units,
- historical CCR unit design and construction documentation, and
- 2015 Annual CCR Inspection Report.

2.1 CCR Fugitive Dust Control Plan

The CCR FDCP for the MLSES dated October 2015 was reviewed by PBW as part of the annual CCR inspection process. The FDCP was certified by a Registered Professional Engineer on October 5, 2015, and placed into the operating record on October 16, 2015. The MLSES CCR FDCP includes the following dust control measures:

- Water spray or fogging systems;
- Compaction;
- Vegetative cover; and
- Reduced vehicle speeds.

Controls are also in-place at the Beckville Mine to comply with the FDCP during placement of CCR within the A-1 Area Landfill. The FDCP includes provisions to amend the plan as necessary, and the plan includes a log for citizen complaints. No citizen complaints were recorded with the FDCP at the time of the annual inspection.

2.2 Weekly Qualified Person Inspection Records

Weekly inspections of CCR Units by a qualified person are required under Section 257.84(a) of the CCR Rule. Weekly CCR qualified person inspections of A-1 Area Landfill were performed throughout 2016. Given the size of the A-1 Area Landfill, weekly inspections consist of the following three elements: (1) an inspection of the entire landfill perimeter and capped areas in a vehicle; (2) direct visual inspection of any areas noted for on-going monitoring or repair; and (3) a walking inspection of an at least a 3,500 linear foot portion of the perimeter embankment. This process allows for the identification of any changes or conditions that may disrupt or have the potential to disrupt the operation and safety of the CCR unit, while ensuring a minimum of seven walking inspections of the perimeter embankment are completed each year. To facilitate the inspection and monitoring activities, Luminant has established perimeter stationing (staked at 500 foot intervals) along the surveyed limits of the A-1 Area Landfill, and observations noted during the field inspection are reference to the field stationing. PBW reviewed the weekly qualified person inspection forms for A-1 Area Landfill prepared from the time of the 2015 annual inspection through the date of the 2016 annual inspection by PBW.

Items identified for monitoring or action at the A-1 Area Landfill during the 2016 weekly qualified person inspections can be summarized as follows:

- Monitor saturated soil conditions at toe of embankment between Stations 14+00 and 38+00;
- Monitor groin erosion repair and rockfill near Station 134+00
- Monitor and repair feral hog damage as slope conditions allow;
- Monitor and repair minor slope erosion as conditions allow;
- Monitor saturated soil/seepage near toe of embankment for South Run-Off Collection Area (SROCA) near Stations 223+00 and 214+00; and
- Continue minor repairs, reseeding and mowing as conditions allow.

Wet areas/seepage was frequently noted in several areas along the toe of the A-1 Area Landfill during the weekly qualified person inspections. These wet areas are identified, categorized as either being saturated (i.e. pooling/puddling) or saturated with areas exhibiting active/visible seepage, which allows for on-going monitoring to identify potential changes or conditions that could result in a structural weakness in the embankments surrounding the landfill. No areas of pressurized discharge, discolored or sediment-laden seepage, which are often associated with piping, were noted during the weekly inspections. Other observations/recommended action items were limited to routine maintenance of access roads, mowing,

and repair of erosion or animal burrows that do not currently have potential to result in a structural weakness or disrupt the operation and safety of landfill.

2.3 CCR Unit Design and Construction Documentation

Luminant provided PBW with the following historical documents:

- Hydrogeologic/Geotechnical Evaluation A-1 Expansion Area (MFG, November 1991);
- A-1 Disposal Area Expansion, Class II Landfill Expansion Registration Notification and Technical Report (TU Electric Company, June 1993);
- CCR Closure Plan – Martin Lake Steam Electric Station A-1 Area Landfill (PBW, 2016c).

These documents include information concerning the siting study, construction specifications (i.e. clay liner and cap placement), and typical design section of the perimeter embankments and soil cap for the A-1 Area Landfill. A summary of available design and construction characteristics for the A-1 Area Landfill is also presented in Section 1.2 of this annual report. As indicated in 2015 Annual CCR Unit Inspection Report (PBW, 2016a), a geotechnical evaluation of the northern embankment of the A-1 Landfill was initiated in response to the discovery of a seep on November 12, 2015 at the toe of the embankment approximately 1,300 feet southeast of the North Run-off Collection Area (Station 27+00). The primary findings and recommendations of the geotechnical evaluation performed in 2016 include but were not limited to:

- The results of an electromagnetic (EM) survey identified elevated terrain conductivity values that generally correlated with saturated surface soil conditions between Station 21+00 to Station 35+00. Visual observations of seepage and the results of the EM survey were used to develop the scope of the geotechnical investigation.
- An 18-foot-thick saturated sand interval was encountered at 10.5 feet bgs during completion of a soil boring at the crest of the embankment near the observed seep. The sand strata was also encountered in soil borings completed along the crest of the embankment for a distance of over 400 linear feet, and the saturated sand interval is generally centered near the observed seep at the toe of the embankment. The top of the sand strata was also encountered at the toe of the embankment at a depth of four to six feet bgs near the apparent water seep location. The saturated sand interval was also encountered approximately 7 to 12 feet beneath the landfill liner in soil borings B-10 and B-11, respectively, which indicates the sand present within four feet bgs near the apparent water seep extends beneath the perimeter embankment and beneath the capped/lined portion of the landfill for a distance of over 90 feet. The mine spoil surrounding the sand strata consists primarily of silty clay that was saturated throughout the Area of Concern (AOC).

- Static water level was measured near or above ground surface in nested pairs of piezometers installed within the AOC as well as in the two nearest existing monitoring wells completed in the mine spoil (i.e. BMW-7R and BMW-9R). Increasing water table conditions have been observed over time in existing monitoring wells completed within the underlying mine spoil in this area, indicating gradual re-saturation of the spoil near the AOC.
- In accordance with TCEQ Technical Guideline No. 3, the minimum factor of safety for potential catastrophic failure of a permanent embankment slope (long-term slope failure) used to contain non-hazardous industrial solid waste above ground (i.e. Class II landfills) is 1.3. The results of a geotechnical evaluation of the A-1 Area Landfill northern perimeter embankment indicate that the embankment in the immediate vicinity of a seep (Station 27+00) meets the applicable TCEQ minimum factor of safety for slope stability under current conditions (BBA, 2016).
- Although the slope stability analysis of the A-1 Area Landfill northern perimeter embankment complies with the applicable TCEQ minimum factor of safety under current conditions, interim actions were recommended to mitigate observed seepage within the AOC. The most readily implementable alternative was to lower the groundwater elevation within the saturated sand interval encountered in the immediate vicinity of the seep. Since the observed sand thickens beneath the embankment, installation of extraction wells along the embankment crest were recommended prior to implementing any corrective actions in the immediate vicinity of the observed seep (i.e. near the toe of the embankment).
- The saturated CCR encountered within the landfill exhibits a significantly lower hydraulic conductivity than the saturated sand interval, dewatering of this interval may be necessary to reduce hydraulic head in the vicinity of the seep particularly if a hydraulic connection is observed during operation of the interim dewatering well network.
- During on-going operation of the active disposal area, accumulation of storm water in the NROCA and other areas within the limits of the A-1 Area Landfill should be minimized to the extent practicable.

To reduce the hydraulic head within the sand strata identified as the source of the seep near Station 27+00, interim measures were initiated on September 1, 2016 by installing and operating a constant drawdown dewatering pump in an existing 4-inch piezometer (GT-5). To date, over 800,000 gallons of water has been pumped from GT-5, which is completed at the crest of the embankment within the saturated sand strata underlying the embankment. Static water levels within the sand strata in the vicinity of the former seep have been lowered between 3.5 to 6.5 feet as a result of the interim measures.

2.4 2015 Annual CCR Inspection Report

PBW reviewed the 2015 Annual CCR Inspection Report for the CCR Units at the MLSES (PBW, 2016a). The recommendations from the 2015 Annual CCR Inspection Report and the status of activities to address the recommendations at the time of the 2016 Annual CCR Inspection can be summarized as follows:

<p align="center">Recommendation from 2015 Annual CCR Inspection</p>	<p align="center">Status at Time of 2016 Annual CCR Inspection</p>
<p>Monitor embankment that was repaired in response to the presence of a seep near Station 27+00, no evidence of slope movements or miss-alignments that have potential to affect the structural integrity of the landfill embankments were noted. Surficial placement and compaction of fill altered the slope profile and a visual determination regarding potential miss-alignments or other indications of an unstable condition that could have the potential to affect the structural integrity of the embankment could not be made during the inspection.</p> <p>As part of the on-going evaluation of seepage observed at the A1 Area Landfill, Luminant is currently implementing a geotechnical study that will include an evaluation of slope stability in the area of the observed seepage.</p>	<p>Results of a geotechnical investigation of the north embankment of the A-1 Area Landfill concluded:</p> <ul style="list-style-type: none"> • In accordance with TCEQ Technical Guideline No. 3, the minimum factor of safety for potential catastrophic failure of a permanent embankment slope (long-term slope failure) used to contain non-hazardous industrial solid waste above ground (i.e. Class II landfills) is 1.3; • The results of a geotechnical evaluation indicate that the embankment in the immediate vicinity of a seep (Station 27+00) meets the applicable TCEQ minimum factor of safety for slope stability under current conditions (BBA, 2016). • Although the slope stability analysis of the A-1 Area Landfill northern perimeter embankment complies with the applicable TCEQ minimum factor of safety under current conditions, interim actions described in Section 2.3 were taken to mitigate observed seepage within the AOC. Lowering the static water levels within the AOC have been effective in mitigating the active seepage previously observed by Luminant. • Saturated soil conditions are present at toe of the embankment; however, no active seepage was observed during the 2016 CCR inspection.
<p>Areas recommended for repair included:</p> <ul style="list-style-type: none"> • Erosion near the crest of the embankment on the east side of the railroad embankment near Station 132+00; • Localized area of subsidence on north side of the access road near the toe of the embankment (Station 67+00). 	<p>Recommended repairs were completed. With the exception of inspecting/maintaining the rockfill and check dam along the flow path causing the groin erosion near Station 132+00, no further action is necessary based on conditions observed during the 2016 CCR inspection. Both areas are monitored as part of weekly inspections.</p>

Recommendation from 2015 Annual CCR Inspection	Status at Time of 2016 Annual CCR Inspection
<p>Monitor the following recent embankment repairs to ensure the repaired area remains stable and uniform vegetative cover is achieved:</p> <ul style="list-style-type: none"> • Drainage improvement near toe of the embankment (Station 13+00); • Drainage improvement near embankment toe between Station 16+00 and 25+00; • Major slope repair in the vicinity of a recent seep (Station 27+00); • Wet area recently repaired just beyond the toe of the embankment (Station 32+00); • Slope repair near the embankment crest (Station 108+00); • Slope repair near the embankment crest (Station 121+00); • Storm water let-down inlet area at the embankment crest (Station 127+00); • Wet area recently repaired on slope between Station 139+00 to 142+00; and • Slope/road repair near embankment crest (Station 227+00). 	<p>Recent embankment repairs observed during the 2015 CCR inspection have been adequately stabilized and permanent vegetative cover is established. No further action is necessary based on conditions observed during the 2016 CCR inspection. These areas are monitored as part of weekly inspections.</p>

Recommendation from 2015 Annual CCR Inspection	Status at Time of 2016 Annual CCR Inspection
<p>The 2015 inspection occurred immediately following heavy fall rains and monitoring of the following excessively wet areas was recommended:</p> <ul style="list-style-type: none"> • Embankment at the following locations <ul style="list-style-type: none"> - Station 8+00 to 10+00; - Improved drainage ditch with baseflow present (Station 13+00 to 32+00); - Station 51+00; - Heavily vegetated drainage ditch with baseflow (Station 68+00 to 103+00); - Station 139+00 to 142+00; - Station 215+00; and - Station 219+00 to 221+00; • Monitor the wet area immediately downslope of the contact water collection sump near the crest of the embankment (Station 89+00). • Monitor two wet areas on the upper portion of the slope (near same elevation) of the northwest embankment near Stations 214+00 and 218+00. Wetness was observed on the embankment immediately downslope of SROCA. 	<p>The 2016 CCR inspection occurred during an extended period of dry conditions that allowed for identification of the perennially saturated areas illustrated on Figure 3. Despite the presence of saturated surface soil, active seepage was not observed at the time of the CCR inspection.</p> <p>Effectiveness of the interim pumping remedy near the former seep (Station 27+00) is being monitored by routine gauging of static fluid levels in piezometers installed as part of the geotechnical investigation. Measurable drawdown is currently observed within 300 feet of the pumping well (GT-5) in piezometers completed within the same saturated sand interval. However, artesian conditions persist in the lower permeability mine spoil (i.e. clayey material) located near the toe within the AOC.</p> <p>Although saturated soil conditions persist in areas noted on Figure 3, it appears the seepage observed during the 2015 CCR inspection was associated with heavy rains that occurred prior to the 2015 inspection.</p>
<p>Widespread feral hog damage is present on the embankment as illustrated on Figure 8. Areas of heavy damage noted should be monitored to ensure erosion is not occurring due to the irregular slope and loss of vegetation. These areas should be repaired when conditions allow and a more aggressive deterrent program should be implemented.</p>	<p>Only isolated areas of feral hog damage were noted during the 2016 CCR inspection. Major areas of hog damage noted during the 2015 inspection were repaired and re-vegetated as slope/cap conditions allowed.</p>
<p>Monitoring of numerous areas of limited vegetative cover, minor rill erosion, rutting and other minor erosional features was recommended; however, these areas do not currently pose a significant risk to the structural stability of the embankments. Hence, these recommended actions should only be completed when surface conditions allow for equipment access without causing further damage to the areas of concern.</p>	<p>Routine mowing, repair of minor erosional features are performed routinely and repairs are documented on weekly inspection forms. These areas are monitored as part of weekly inspections until vegetative cover is established.</p>

3.0 CCR LANDFILL FIELD INSPECTION

The 2016 annual inspection of the MLSES A-1 Area Landfill was performed on November 17, 2016. Brian Thomas, a registered professional engineer in the State of Texas, was accompanied by a Luminant qualified person (Marvin Bradford) during an initial inspection of areas where repair or monitoring was recommended based on the 2015 annual inspection. The inspection consisted of a walking visual survey of the embankments, cap, and storm water control structures of the A-1 Area Landfill. Current observations were recorded in the field using a hand-held global positioning system survey instrument in order to locate areas that require further monitoring and/or action to address potential areas of concern noted during the inspection. Figure 3 summarizes the field observations from the inspections of the A-1 Area Landfill. Photographs of the landfill taken during the annual inspection are included as Appendix A. Figure 4 illustrates the location where photographs were taken during the inspection of the A-1 Area Landfill. The following sections present the results of the annual inspection, including specific observations related to the structural elements of the A-1 Area Landfill.

The inspection requirements for CCR landfills include a review of the design, construction, operation and maintenance of the landfill in order to determine if the CCR unit meets generally accepted good engineering practice. The primary objective of the visual inspection of the A-1 Area Landfill was to identify any evidence of actual or potential structural weakness of the CCR unit, including conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit.

Approximately 480 acres of the A-1 Area Landfill has been completed with the final cap and cover system described in Section 1.2, and with exception of an approximately 100-acre portion of the registered limits of the A-1 Area Landfill Area, subgrade preparation and placement of the bottom compacted clay liner has been completed. CCR placement is primarily focused near the central portion of the landfill until the design cap subgrade elevations are reached. As the design subgrade elevations are achieved, the landfill is progressively closed with the final cap and vegetative cover system. The field inspection of the landfill included a walking survey of the perimeter embankment or limits of incised areas within the registered landfill limits and a vehicular inspection of capped/closed portions of the landfill cap, including an approximately 30-acre portion of the clay cap completed in 2016. Observations were recorded in the field using a hand-held global positioning system and referenced to existing stationing marked at 500 foot intervals along the permitted limits of the A-1 Area Landfill. Inspection of the cap and vegetative cover system, active disposal areas, and the surface water control structures was

performed in conjunction with the embankment inspection as well as during the driving survey of the landfill. Additional details concerning the landfill inspection are included in the following sections.

3.1 Perimeter Embankment

Topography along the 5-mile perimeter of the A-1 Area Landfill (permitted limits) varies greatly. Given the size and siting of the landfill within the reclaimed portion of the Luminant Beckville Mine, the perimeter earthen embankment varies from absent (within incised portions of the landfill) to heights greater than 20 feet within the closed/capped portions of the landfill. With exception of areas of limited vegetative cover noted on Figure 3, the embankments were well vegetated with grasses that have been mowed to allow for visual inspection. Areas near the toe that were repaired or cleared and grubbed of vegetation prior to the 2015 annual CCR inspection have been stabilized by establishing vegetative cover in the affected areas. Based on conditions observed during the 2016 weekly inspections as well as the 2016 annual CCR inspection, areas of wet soil conditions persist between Stations 14+00 and 38+00 as well as near the toe of the embankment for the SROCA (Stations 214+00 and 223+00); however, the widespread areas of saturated soil on the embankments and pooling at the toe observed during the 2015 CCR inspection were generally absent at the time of the November 2016 inspection (Figure 3). Furthermore, the area where discrete seepage was observed by Luminant prior to the 2015 inspection (i.e. near Station 27+00) has been eliminated as a result of the interim pumping remedy described in Section 2.3.

As previously noted, that surface conditions at the Site were dry due to an extended period without rainfall prior to the 2016 annual inspection. Performing the recommended monitoring of wet areas as part of the 2016 weekly inspection activities allowed for the identification of persistently wet areas. As indicated on Figure 3, the following areas were noted for future monitoring:

- Monitor limited vegetative cover and minor erosion beneath infrastructure on the NROCA downstream embankment near Station 11+00.
- Monitor the following areas where saturated soil was observed at the toe of the slope:
 - Station 15+00 to 38+00, including drainage ditch (Station 13+00 to 25+00);
 - Station 71+00 to 75+00; and
 - Toe of the SROCA embankment (Station 214+00 and 223+00);
- Monitor the wet areas at the crest of the embankment along the lower portion of the north embankment access road, which are directly adjacent to the surface water diversion berm for the NROCA (Appendix A; Photograph 3).

- Monitor recently capped areas following significant rainfall events to identify areas of erosion and ensure adequate vegetative cover is established. Upon establishment of vegetative cover, storm water run-off should be diverted off the capped area to reduce storm water accumulation in the NROCA.
- Monitor the re-vegetation of an area affected by a recent grass fire on the southernmost closed portion of the landfill.
- Although very limited with respect to conditions observed during the 2015 annual CCR inspection, feral hog damage present on the embankment as illustrated should be monitored to ensure erosion is not occurring due to the irregular slope and loss of vegetation (Figure 3). These areas should be repaired when conditions allow and the existing deterrent program should be reviewed and improved to prevent further damage to the extent practicable.

3.2 Landfill Cap

With exception of the approximately 100-acre portion of the capped area that was placed in 2016, the capped portion of A-1 Area Landfill is generally in a stable condition with a well maintained 3-foot thick compacted clay cap with additional vegetative soil cover. Although slope lengths are long in some areas, the vegetative cover is generally in very good condition and the slopes typically do not exceed 3 percent, which results in relatively low potential for erosion. Storm water diversion berms are present on the south and east sides of the landfill cap to prevent surface water from reaching contact water collection sumps present along the crest of the embankment in these areas (Figure 3). A new storm water let-down structure was constructed in 2016 with a discharge point located near Station 38+00. The outlet of the storm water conveyance structure, which is armored with revetment stone, should be monitored to ensure potential erosion within this area is not affecting the toe of the embankment. Additional details concerning the sumps, contact, and non-contact storm water is provided in Section 3.4. Inspection of the capped portion of A-1 Area Landfill indicates that conditions that could disrupt or have the potential to disrupt the operation and safety of the CCR unit are not currently present.

3.3 Active CCR Placement Areas

The majority of CCR placement is occurring near the central portion of the landfill in an effort to fill this area to target subgrade elevations. However, CCR is also placed within other areas of the landfill to allow for final subgrade preparation and progressive capping of the landfill. As indicated in Section 3.2, an approximately 30-acre portion of the landfill immediately west of the NROCA and southward was capped in 2016. Luminant personnel maintain and update a conceptual material placement and progressive capping plan with current operating projections through the year 2025.

In addition to the FDCP Luminant has also implemented a surface water control plan to divert storm water from uncapped and/or active CCR disposal areas to holding ponds where the water can be transferred to treatment ponds within the A-1 Area, if needed, prior to discharge through permitted outfalls monitored by Luminant (PBW 2016d). Additional details concerning surface water drainage controls are provided in Section 3.4.

3.4 Surface Water Controls

Storm water is diverted off the capped portion of the A-1 Area Landfill to adjacent surface water ditches that provide drainage to areas within the Luminant Beckville Mine and ultimately to final discharge ponds that are permitted under the Texas Pollutant Discharge Elimination System (TPDES) and monitored by Luminant for compliance with effluent limitations. Storm water run-off from active areas of the landfill is collected in three areas within the A-1 Area Landfill (Figure 3). The NROCA and SROCA are the primary collection areas for storm water from uncapped and/or active CCR disposal areas, while limited collection of storm water from uncapped areas continues to occur within the former South Run-off Collection Area. Accumulated storm water in these areas is pumped to either of two treatment ponds prior to discharge into surrounding drainage ditches that ultimately report to a final TPDES monitoring location within the Beckville Mine.

Berms are located on the landfill cap immediately upslope and downslope of contact water collection sumps, which are located along the south and southeast portions of the landfill. Contact water collected within these sumps is pumped to either of two treatment ponds prior to discharge. Non-contact storm water upstream of the sumps is diverted to storm water let-down structures; however, the very limited slope along these berms and long flow length likely results in additional infiltration in the vicinity of the contact water collection sumps. Collection and management of storm water will be a continuing requirement while the A-1 Area Landfill remains active; however, to the extent possible long-term impoundment of water within the landfill should be minimized to the extent possible.

3.5 Comparison to 2015 Annual CCR Inspection Findings

The findings of the 2016 Annual CCR Inspection of A-1 Area Landfill compare to the findings/recommendations from the 2015 Annual CCR Inspection Report as follows:

- With exception of the placement of additional CCR and capping of an approximately 100-acre portion of the landfill, no significant changes in geometry of the landfill since the previous annual inspection were observed;
- The results of a geotechnical evaluation of the A-1 Area Landfill northern perimeter embankment performed in 2016 indicate that the current condition of the embankment in the immediate vicinity of a seep observed by Luminant in 2015 (Station 27+00) meets the applicable TCEQ minimum factor of safety for slope stability of permanent embankments used to contain non-hazardous industrial solid waste above ground (BBA, 2016).
- No other changes which could affect the stability or operation of the landfill since the previous annual inspection were observed; and
- The recommendations presented in the 2015 Annual CCR Inspection Report have all been addressed by Luminant (See Section 2.4 of this report).

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4.0 SUMMARY OF FINDINGS

The findings of the 2016 annual inspection of the A-1 Area Landfill at the MLSES is summarized herein. Luminant qualified persons responsible for the weekly inspections accompanied PBW during an initial inspection of previously identified areas where repair or monitoring was recommended to ensure that observed conditions did not represent a change in geometry since previous inspection or have the potential to disrupt operation and safety of the CCR unit.

4.1 Visual Observation of Embankment Alignments

Consistent with the previous annual CCR inspection performed on behalf of Luminant and recently completed weekly inspections, no evidence of slope movements or misalignments that have potential to affect the structural integrity of the landfill were noted.

4.2 Landfill – Visual Observations of Structural Integrity

No conditions were observed during the 2016 annual inspection that indicates an actual or potential structural weakness of the perimeter embankments surrounding A-1 Area Landfill. In addition, conditions observed during the annual inspection indicate that a disruption or the potential for disruption of the operation and safety of the CCR unit is not currently anticipated. A review of weekly inspections completed to date by Luminant and the completion of this annual inspection did not identify any changes that may affect the stability or operation of the landfill. Continued visual inspection of areas exhibiting persistent saturated soil conditions near the toe of the perimeter embankment (Figure 3) will allow for identification of changes that could warrant response actions in addition to interim measures currently being implemented by Luminant (i.e. pumping from piezometer GT-5).

4.3 CCR Unit Volume at Time of Inspection –Area-1 Area Landfill

During 2016, CCR placement occurred in the non-capped portions of the A-1 Area Landfill. Approximately 3,850,000 tons of CCRs were placed in the landfill from January through November, 2016. To date Luminant estimated that approximately 43,500,000 cubic yards of CCR has been placed in the A-1 Landfill.

5.0 RECOMMENDATIONS

The following recommendations are based on the results of the 2016 annual CCR inspection of the A-1 Area Landfill at the MLSES performed November 17, 2016:

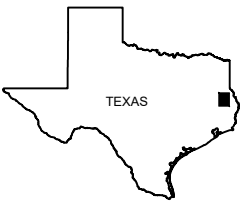
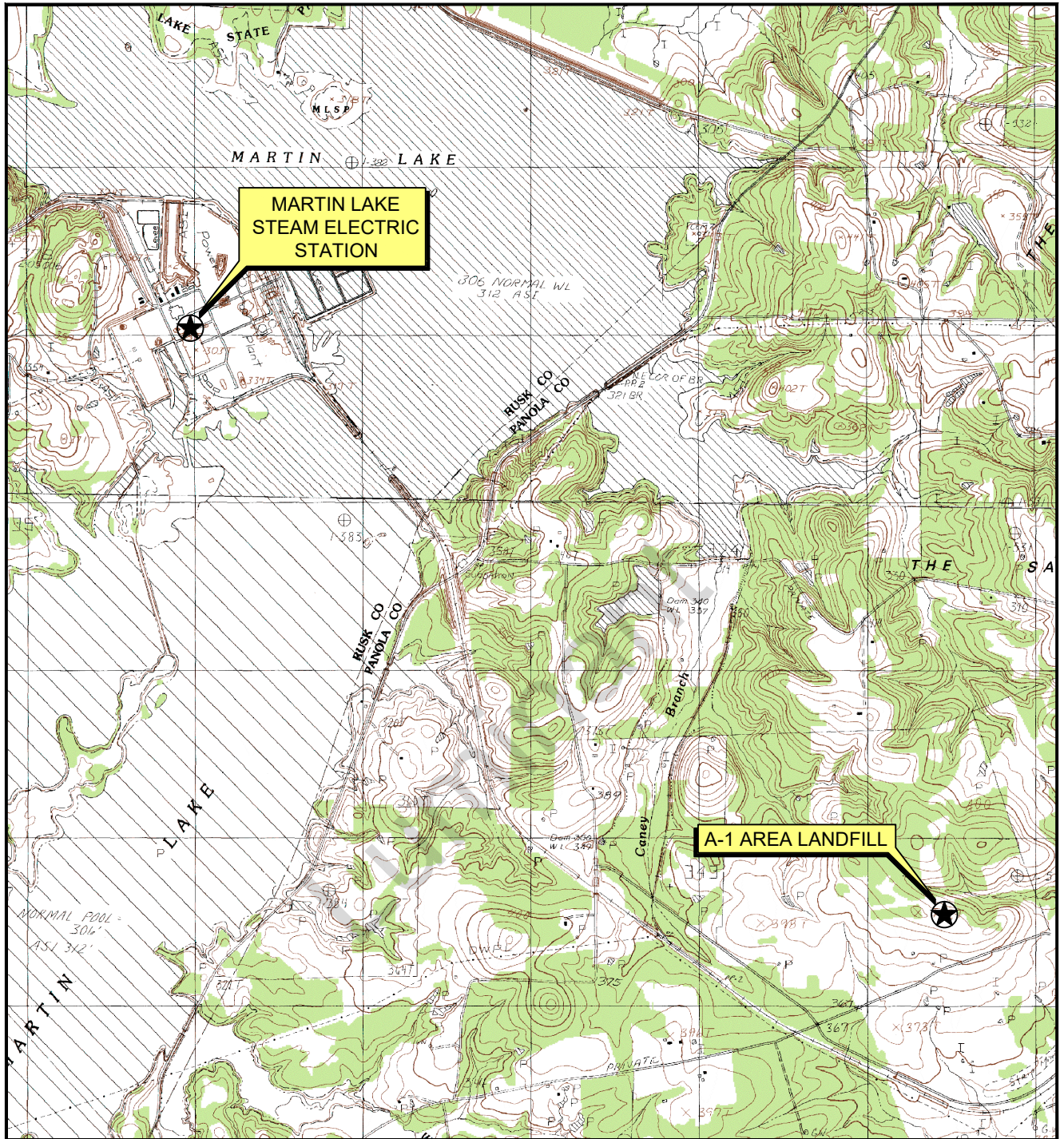
- Monitor the several areas where saturated soil was observed at the toe of the perimeter embankment of the landfill near Stations 15+00 to 38+00, Station 71+00 to 75+00, and the Toe of the SROCA embankment (Station 214+00 and 223+00). Wet areas at the crest of the embankment along the lower portion of the north embankment access road, which are directly adjacent to the surface water diversion berm for the NROCA should also be monitored.
- Monitor recently capped areas following significant rainfall events to identify areas of erosion and ensure adequate vegetative cover is established. Upon establishment of vegetative cover, storm water run-off should be diverted off the capped area to reduce storm water accumulation in the NROCA.
- Monitor the re-vegetation of an area affected by a recent grass fire on the southernmost closed portion of the landfill.
- Monitor isolated areas of minor erosion occurring in areas with limited vegetative cover noted on Figure 3. Continue to monitor/repair feral hog damage present on the embankment to ensure erosion is not occurring due to the irregular slope and loss of vegetation (Figure 3). These areas should be repaired when conditions allow and the existing deterrent program should be reviewed and improved to prevent further damage to the extent practicable.
- This annual inspection report should be completed by filing the report in the operating record of the respective CCR unit no later than January 18, 2017.
- The 2016 annual inspection of the MLSES A-1 Area Landfill should be performed in November/December 2017, unless otherwise required by the CCR rule.

6.0 REFERENCES

- Bullock, Bennett & Associates, LLC (BBA), 2016. *Evaluation of Slope Stability-Luminant Martin Lake Power Plant, A1 Landfill, Rusk County, Texas*, July 29.
- Burns & McDonnell, 2015. *CCR Study for Martin Lake Steam Electric Station, July 31*.
- Golder Associates (Golder), 2016. *Structural Stability Assessment Report – Martin Lake Steam Electric Station*, October.
- McCulley, Frick & Gillman, Inc (MFG), 1991. *Hydrogeologic/Geotechnical Evaluation A-1 Expansion Area. November*.
- Pastor, Behling & Wheeler, LLC (PBW), 2016a. *2015 Annual CCR Unit Inspection Report – Martin Lake Steam Electric Station Ash Pond Area, Permanent Disposal Pond No. 5 and A-1 Area Landfill*, January 18.
- PBW, 2016b. *Limited Assessment – A-1 Area Landfill North Embankment*. July 29.
- PBW, 2016c. *CCR Closure Plan – Martin Lake Steam Electric Station A-1 Area Landfill, Panola County, Texas*. October
- PBW, 2016d. *Run-on and Run-off Control System Plan – Martin Lake Steam Electric Station A-1 Area Landfill, Panola County, Texas*. October
- Pinnacle Technical Resources, Inc., 2014. *Critical Impoundment Inspection Report for Martin Lake Steam Electric Station*. May 14.

FIGURES

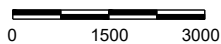
Luminant



QUADRANGLE LOCATION



Scale in Feet



**MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS**

Figure 1

SITE LOCATION MAP

PROJECT: 2226B

BY: AJD

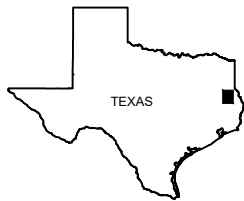
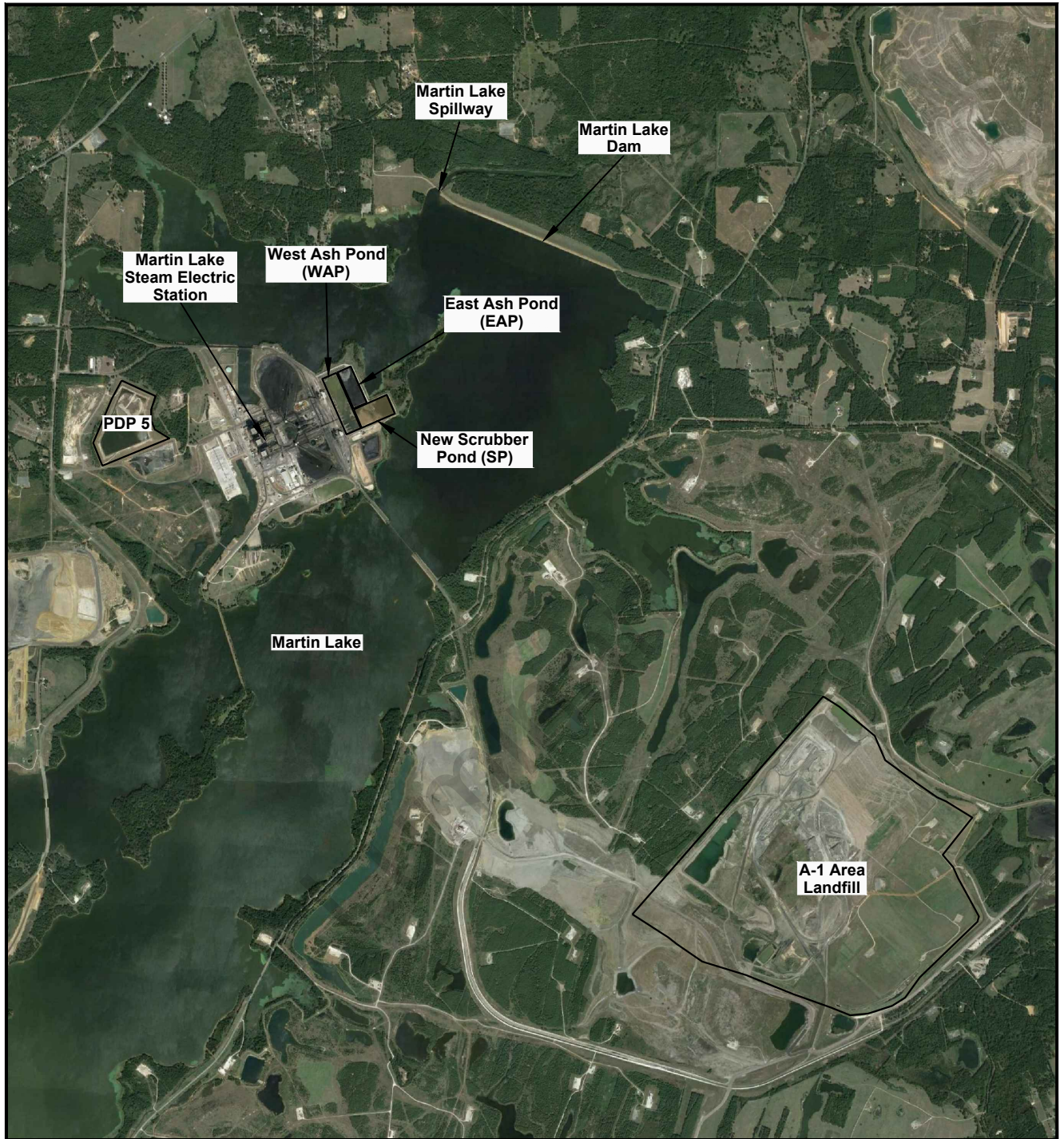
REVISIONS

DATE: DEC., 2016

CHECKED: BDT

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

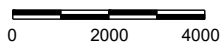
SOURCE:
Base map from www.tnris.gov, Tatum, TX 7.5 min. USGS quadrangle dated 1983.



PHOTOGRAPH LOCATION



Scale in Feet



MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

Figure 2

SITE VICINITY MAP

PROJECT: 2226B

BY: AJD

REVISIONS

DATE: DEC., 2016




CHECKED: BDT

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:
Imagery from Google Earth, photography dated October 1, 2015.



EXPLANATION

-  Monitor Wet Area at Toe
(No Active Seepage Observed
November 17, 2016)
-  Hog Damage Area
-  Monitor Vegetative Cover
(Recently Capped)



Scale in Feet
0 450 900

SOURCE:
Basemap from Luminant, aerial photography dated January 2015.

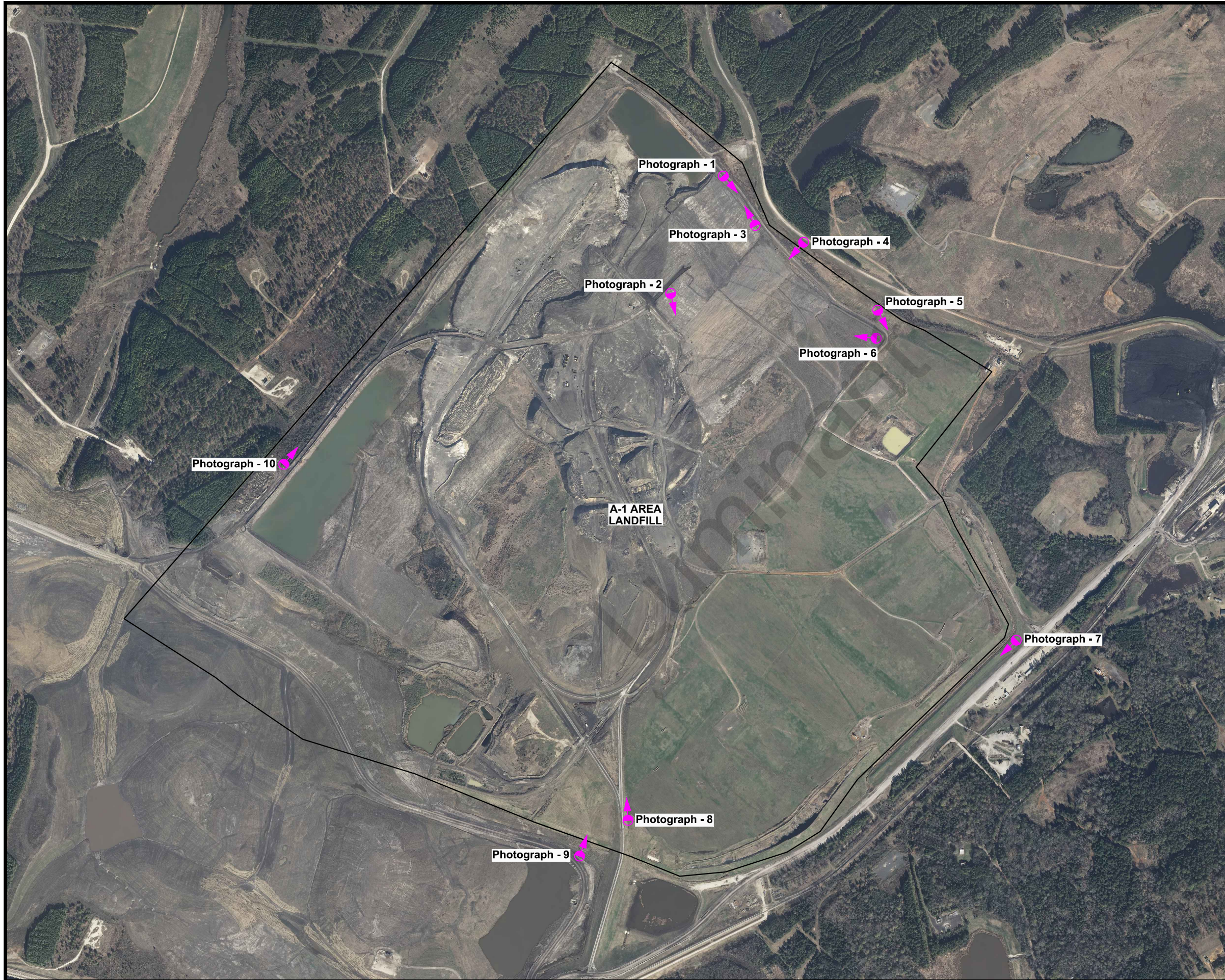
MARTIN LAKE A1 AREA LANDFILL
TATUM, TEXAS

Figure 3

**ANNUAL INSPECTION
FINDINGS SUMMARY MAP
A-1 AREA LANDFILL**

PROJECT: 2226B	BY: AJD	REVISIONS
DATE: DEC., 2016	CHECKED: BDT	

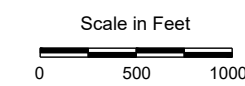
PASTOR, BEHLING & WHEELER, LLC
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EXPLANATION

📍 Photograph Location and Direction

Note:
See Appendix D for Inspection Photographs.



SOURCE:
Basemap from Luminant, aerial photography dated January 2015.

MARTIN LAKE STEAM ELECTRIC STATION
TATUM, TEXAS

Figure 4

**ANNUAL INSPECTION
PHOTOGRAPH LOG
A-1 AREA LANDFILL**

PROJECT: 2226B	BY: AJD	REVISIONS
DATE: DEC., 2016	CHECKED: BDT	

PASTOR, BEHLING & WHEELER, LLC
CONSULTING ENGINEERS AND SCIENTISTS

APPENDIX A
PHOTOGRAPHS – A-1 AREA LANDFILL



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 1 – (View Southeast) Drainage to NROCA along the toe of the storm water diversion berm (at left). Landfill cap visible at right.	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 2 – (View South) Recently placed Clay cap	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 3 – (View Northwest) Saturated soil along north access road. Diversion berm for NROCA visible at left.	
PROJECT NO. 2226-B	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 4 – (View Southwest) Former embankment repair near Station 27+00. GT-5 visible between power poles (top of embankment).	
PROJECT NO. 2226-B	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 5 – (View Southeast) Storm water let-down structure	
PROJECT NO. 2226-B	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler	DESCRIPTION	Photograph 6 – (View West) Landfill cap near inlet to storm water let-down structure.	
PROJECT NO. 2226-B	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 7 – (View Southwest) South embankment with drainage ditch conveying treated effluent from North Treatment Pond at left.	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 8 – (View North) Former area of groin erosion repaired with rockfill and erosion control mat.	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 9 – (View North) South embankment and cap areas affected by a recent grass fire.	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016



Pastor, Behling & Wheeler PROJECT NO. 2226-B	DESCRIPTION	Photograph 10 – (View Northeast) Downstream embankment of South Run-off Collection Area	
	SITE NAME	Martin Lake A-1 Area Landfill – Annual Inspection	DATE 11/17/2016