

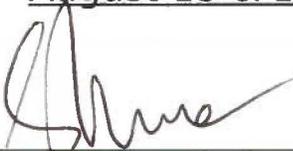
**2017 LANDFILL INSPECTION REPORT
LITTLE BROAD RUN LANDFILL
CLASS F INDUSTRIAL WASTE LANDFILL**

**GERs-17-023
Revision 0**

**AMERICAN ELECTRIC POWER
APPALACHIAN POWER COMPANY
MOUNTAINEER POWER PLANT
NEW HAVEN, WEST VIRGINIA**

INSPECTION DATE August 15 & 16, 2017

PREPARED BY


Shah S. Baig, P.E.

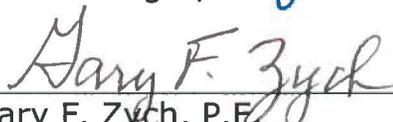
DATE 09-07-2017

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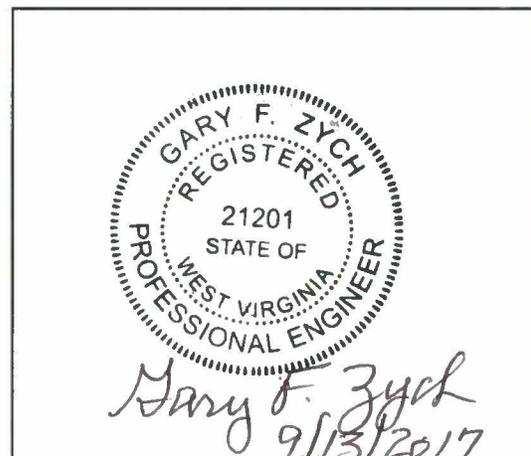

Brett A. Dreger, P.E.

DATE 9/7/2017

APPROVED BY


Gary F. Zych, P.E.
Manager - Geotechnical Engineering Services

DATE 9/13/2017



**PROFESSIONAL ENGINEER
SEAL & SIGNATURE**

2017 LANDFILL INSPECTION REPORT

GERS-17-023

**MOUNTAINEER PLANT
NEW HAVEN, WEST VIRGINIA**

**PREPARED BY
GEOTECHNICAL ENGINEERING
AEP SERVICE CORPORATION
1 RIVERSIDE PLAZA
COLUMBUS, OHIO**

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1.0 INTRODUCTION

Civil Engineering personnel from the American Electric Power Service Corporation performed the 2017 Annual Landfill Inspection of the Little Broad Run Landfill (landfill) to satisfy the requirements of 40 CFR Part 257.84(b). Items required under 40 CFR Part 257.84(b), including weekly ‘inspection by a qualified person’ required under 40 CFR Part 257.84(a) and results from the previous annual landfill inspections were reviewed prior to performing this inspection. The inspection was performed to ensure the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards as required by 40 CFR Part 257.84(b). This report has been prepared to summarize the findings of the inspection, assess the overall condition of the landfill, and provide recommendations for remedial measures.

Shah Baig, P.E., Geotechnical Engineering Services Section, conducted the landfill annual inspection. Mr. Chris Purdum, Landfill Supervisor and Mr. Randy Brown, Plant Environmental Coordinator at the Mountaineer Plant were the facility contacts and coordinated during the landfill inspection. The landfill inspection was performed on August 15 and 16, 2017. Weather conditions were good, clear sky, and light breeze in the morning. Temperatures were in 70’s in the morning and reached a high of 85° F in the afternoon.

This report has been prepared by Mr. Shah Baig, P.E. under the direct supervision of Mr. Gary Zych, P.E., Geotechnical Section Manager. The report presents: (i) summary of visual observations and findings; (ii) conclusions; and (iii) recommendations. Select photographs identifying typical conditions, problem areas, items that need correction or requiring additional monitoring, have been selected from the inspection field photographs and provided in the appendix of this report. AEP Civil Engineering Laboratory also conducted the facility annual survey of the landfill.

Mountaineer Landfill personnel conduct regular inspections and prepare 7-day inspection reports. Geotechnical Engineering staff reviews the 7-day inspection reports and take appropriate corrective action as needed. The 2016 Landfill Inspection report was also reviewed before conducting this inspection.

2.0 FACILITY DESCRIPTION

Figure 1 included in Appendix A illustrates major components of the landfill facility that includes leachate collection ponds, landfill, ash pond complex, and stacker pad. Figure 2 provides general overview of the landfill and breakdown of areas (1-9). The landfill is permitted for nine disposal areas (Areas 1 through 9) and vertical expansion is designed over an approximately area of 209 acres. The vertical expansion is currently divided into four development phases and could be adjusted based on the operational needs.

The landfill inspection included all the fill areas (1-9), the stormwater management system, leachate collection management system, access roads and ditches, and conveyance channels.

At the time of the landfill inspection, waste filling was occurring within the vertical expansion area. The filling was in accordance with the approved phasing consistent with the approved permit. Areas outside of the current filling area were generally covered with temporary soil cover.

3.0 IN-PLACE WASTE VOLUME AND REVIEW OF MOST RECENT SITE TOPOGRAPHY

3.1 In-Place Waste Volume

AEP has estimated that the current waste volume placed in the landfill is approximately 21.65 million cubic yards as of August, 2017.

3.2 Site Topography

Site topographic information was most recently obtained in November 2016 as part of the site annual survey. Based on a general review of the topographic information and our site knowledge regarding the design, permit and operational requirements, the landfill topographic conditions were in compliance with the design and permit requirements.

4.0 SUMMARY OF VISUAL OBSERVATIONS

The summary of the visual observations uses terms to describe the general appearance or condition of an observed item, activity or structure. Their meaning is understood as follows:

Good:	A condition or activity that is generally better or slightly better than what is minimally expected or anticipated from a design or maintenance point of view.
Fair or Satisfactory:	A condition or activity that generally meets what is minimally expected or anticipated from a design or maintenance point of view.
Poor:	A condition or activity that is generally below what is minimally expected or anticipated from a design or maintenance point of view.
Minor:	A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below what is normal or desired, but which is not currently causing concern from a structure safety or stability point of view.
Significant:	A reference to an observed item (e.g. erosion, seepage, vegetation, etc.) where the current maintenance program has neglected to improve the condition. Usually, conditions that have been previously identified in the previous inspections, but have not yet been corrected.
Excessive:	A reference to an observed item (e.g., erosion, seepage, vegetation, etc.) where the current maintenance condition is below or worse than what is normal or desired, and which may have affected the ability of the observer to properly evaluate the structure or particular area being observed or which may be a concern from a structure safety or stability point of view.

In addition, a “deficiency” is some evidence that a landfill has developed a problem that could impact the structural integrity of the landfill. There are four general categories of deficiencies. These four categories are described below:

1. Uncontrolled Seepage:

Uncontrolled seepage is seepage that is not behaving as the design engineer has intended. An example of uncontrolled seepage is seepage that comes through or around the embankment and is not picked up and safely carried off by a drain. Seepage that is collected by a drain can still be uncontrolled if it is not safely collected and transported, such as seepage that is not clear. Seepage that is unable to be measured and/or observe it is considered uncontrolled seepage.

[Wet or soft areas are not considered as uncontrolled seepage, but can lead to this type of deficiency. These areas should be monitored frequently.]

2. Displacement:

Displacement is a large scale movement of the Coal Combustion By Products, structural fill or other earthen material associated with the landfill. Common signs of displacement are cracks, scarps, bulges, depressions, sinkholes and slides.

3. Blockage of Control Features:

Blockage of Control Features is the restriction of flow at storm water ditches/channels, leachate collection and ground water interceptor drains.

4. Erosion:

Erosion is the gradual movement of surface material by water, wind or ice. Erosion is considered a deficiency when it is more than a minor routine maintenance item.

Results of the visual inspection performed on August 8 and 9, 2017, are summarized below. The photographs location map and inspection photographs are included in Appendices B.

5.0 FINDINGS

- (i) Photograph No. 1 illustrates part of the wastewater pond system. The leachate water from the landfill after going through the leachate collection pond system is discharge into the wastewater pond located at the power plant. The discharge pipes are illustrated in the photo and appeared to be in good functional condition.
- (ii) The two discharge HDPE pipes (8" and 16" diameter) are installed between the leachate collection pond and the wastewater pond. There are numerous cleanouts between the wastewater pond and the leachate collection pond. Typical condition of the cleanout and the concrete manhole is illustrated in Photographs No. 2-4. All the cleanouts were inspected and appeared to be in good functional condition and no leaks were observed.
- (iii) Photograph No. 5 shows the leachate pond collection, sump, and pumping system. Two pumps are installed connected to the 8" and 16" HDPE pipes. For normal flow conditions, the 8" pipe and related pump is used and for high flows during

heavy rain events, the higher flow pump (16" pipe) could be used. The sump concrete structure, piping, and equipment appeared in good functional condition.

- (iv) A typical view of the leachate pond is illustrated in Photograph No. 6. There are two leachate collection ponds that receive waste streams from the landfill and the gypsum stacker pad. Both ponds are lined with concrete. The side slopes and concrete appeared in good condition and no significant cracks or settlement was noticed. The ponds appeared in good functional condition as designed.
(Note: The pipe boot tears noticed in the previous inspection were repaired)

- (v) There are several manholes and cleanouts between the leachate ponds and the landfill. A typical view of the manhole (#8 and 2A) is illustrated in Photographs No. 7 and 8. All the manholes and cleanouts appeared in good functional condition as designed.

- (vi) Area 7 sediments ponds are located at the toe of the northeast corner of the landfill. Area 7 is located upstream of the sediment ponds. Photographs No. 9 and 10 illustrate the general condition of the sediment ponds. Initially there was one sediment pond and the second sediment pond was added later. The interior slopes of the ponds are relatively steep but appeared in stable condition. The ponds appeared to be in good functional condition. Photograph No. 11 illustrate the permitted outfall (outlet #024) in good functional condition without any obstruction to flow.

- (vii) The lower section of Area 3 indicated seepage to the south and a slip to the north (Photographs No. 12 and 13).

Seep and Slip: This item was noted as potential deficiency during the 7-day inspection. This item was discussed by the plant staff with the Geotechnical Engineering and temporary repair was performed in June 2017.

- (viii) Previously repaired area along the outfall (outlet #002) is illustrated in Photograph No. 14. This area and the riprap appeared in good condition. A small area in front of the outfall consists of minor brush growth and the sign post was missing.
- (ix) A typical condition of the outfall (outlet #025) is illustrated in Photograph No. 15. Both the outfall pipes were dry and did not indicate any standing water in the pipe. Minor brush was noticed in an area adjacent to the inlet. Overall, all of the landfill outfalls were in good and functional condition.
- (x) Photographs No. 16-18 illustrate generally good condition of the landfill. The landfill slopes area well maintained and are in good and stable condition. Minor vegetation growth was noticed in the lower section of the landfill.
- (xi) Northwest sediment pond is illustrated in Photograph No. 19. Minor vegetation growth were noticed on the interior slopes, but were in stable condition. The pond appeared to be in good and functional condition as designed.
- (xii) Typical view of the landfill haul road and drainage ditch is illustrated in Photograph No. 20. The gravel road appeared in good and stable condition and no significant ruts, settlement, or misalignment were noticed. Minor vegetation growth was noticed in the ditches.
- (xiii) Gypsum stacker pad is shown in Photographs No. 21 and 22. The sump is located very close to the gypsum stockpile. Also the radial stacker is designed to spread gypsum laterally and is fixed in the vertical direction (height of gypsum). The stockpile is very close to the sump area and has a tendency to carry solids to the sump.

6.0 CONCLUSIONS

- (i) Overall the landfill areas were in good condition and no signs of distress or instability of the slopes were observed, except potential deficiency in Area 3 of the landfill.
- (ii) The storm-water collection system ponds, piping, manholes, cleanouts, and appurtenances were in good functional condition.
- (iii) The leachate collection management system, ponds, sump, manholes, cleanouts, and appurtenances appeared to be in good and functional condition.
- (iv) Minor vegetation growth was noticed in the lower section of the landfill.
- (v) Area 3 of the landfill indicated seepage and slip area close to the toe of the landfill.
- (vi) The gypsum stacker pad appeared to be in good functional condition. Surface runoff from the pad appeared to carry gypsum particles into the sump.

7.0 RECOMMENDATIONS

Following are recommendations based on the inspection of the landfill and its supporting structures. Civil Engineering will assist the plant in the assessment/investigation and the corrective action.

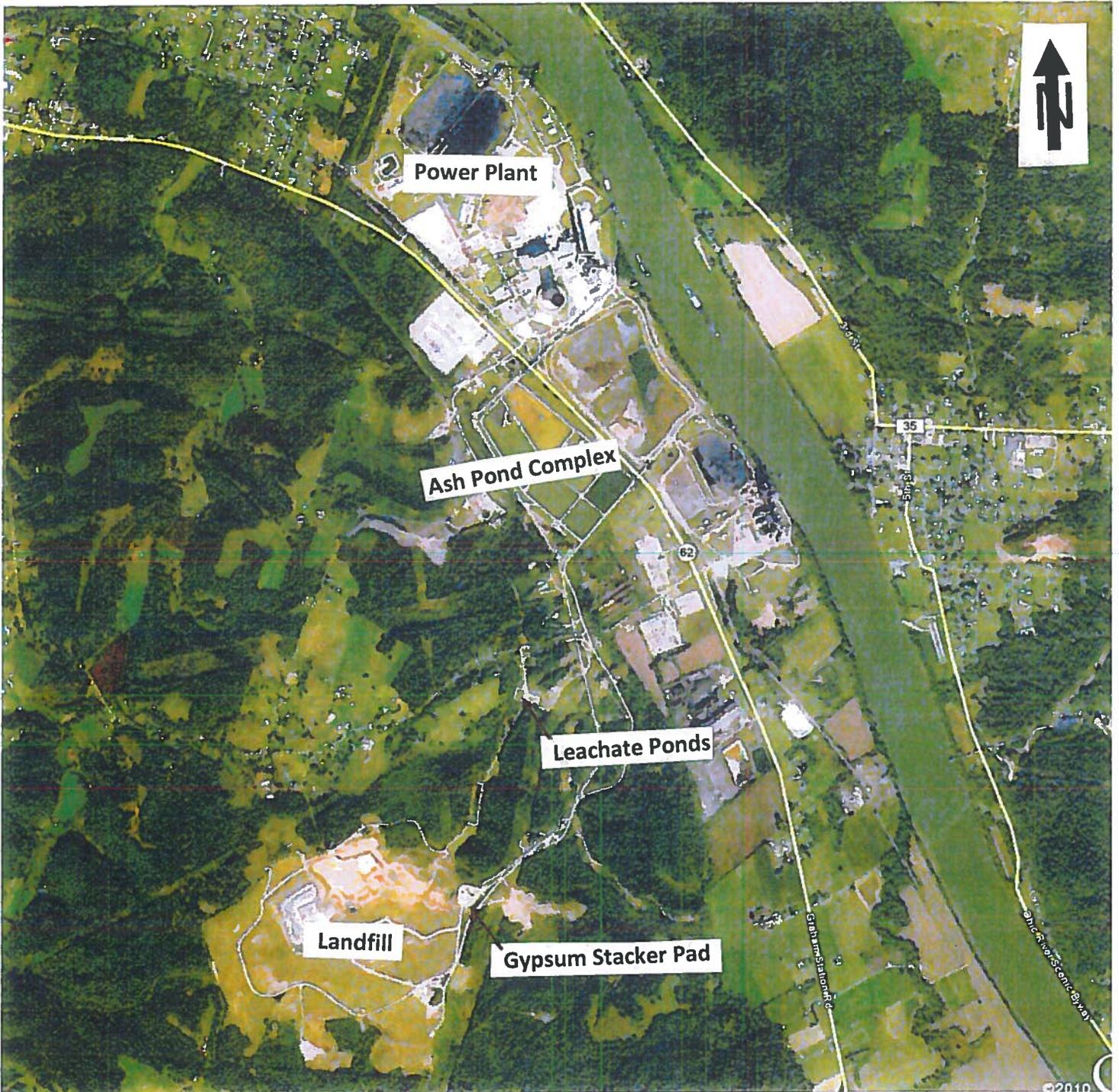
- (i) The seepage and the potential slip area at the Area 3 of the landfill shall be investigated to determine the root cause of the deficiencies and appropriate corrective action in terms of monitoring and/or remediation shall be implemented.
- (ii) Some type of sediment control structure (e.g. barrier or curtain) shall be properly designed and installed that will minimize flow of solids to the sump.

APPENDIX A

Figure 1- Landfill Facility Map

Figure 2 – Landfill Map

Figure 1 – Site Location Map
Little Broad Run Landfill-Mountaineer Plant



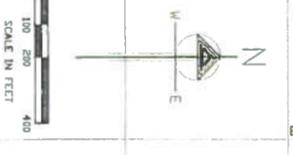
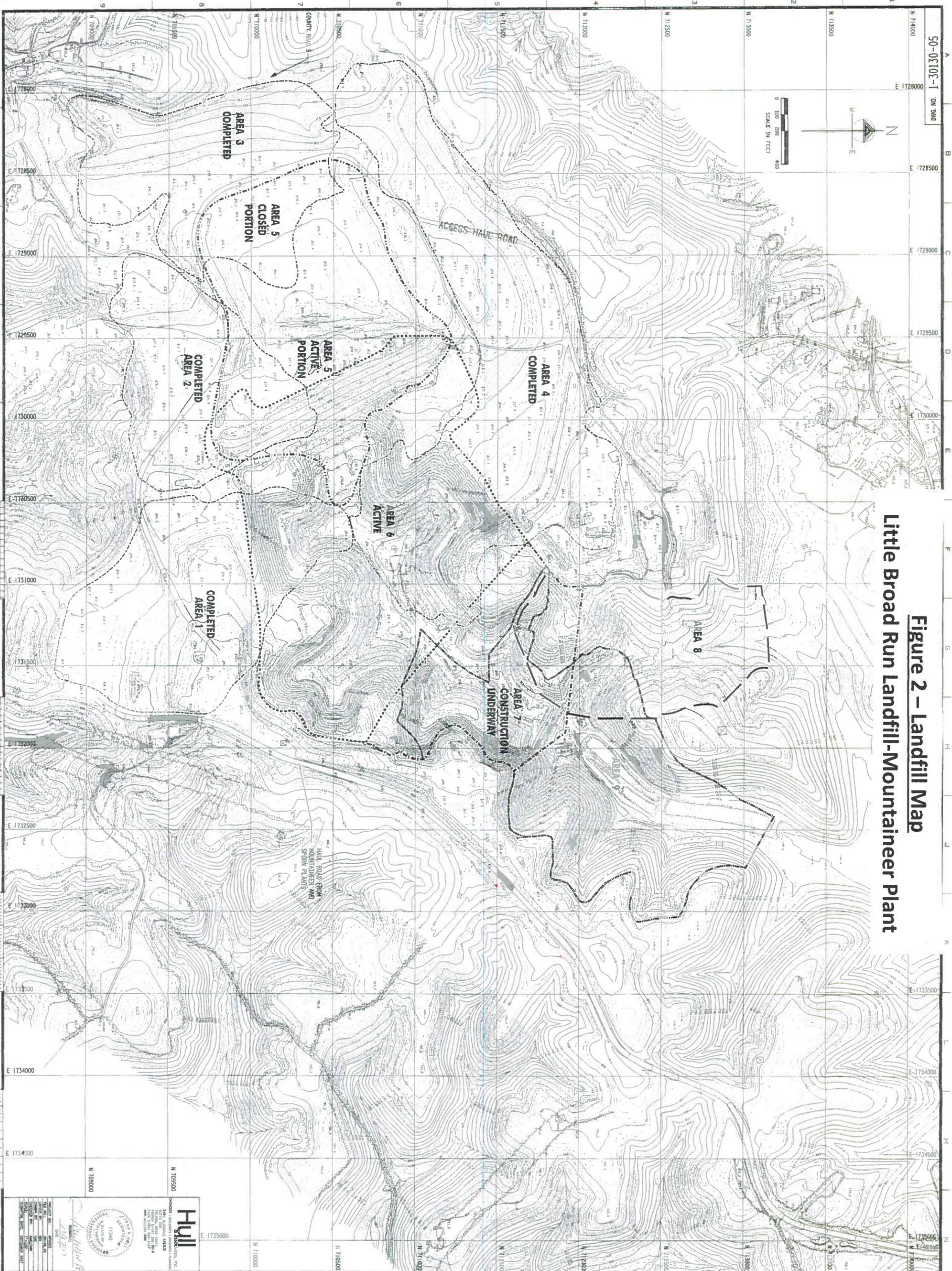


Figure 2 – Landfill Map
Little Broad Run Landfill-Mountaineer Plant



GENERAL NOTES

- 1 THE AERIAL PHOTOGRAPHY WAS UPDATED FROM AERIAL PHOTOGRAPHY BY THE OHIO E. 2004 AND BY HENDERSON AERIAL SURVEYS ON NOVEMBER 22, 2006 AND BY BEIRSBACH DATE OF ORIGINAL AIRPHOTOGRAPHY WAS NOVEMBER 10, 1992. THIS TOPOGRAPHY IS REPRESENTATIVE OF CONDITIONS IN THE DESIGN AREA AREAS 8 AND 9 AT THE TIME OF FINAL MAPPHAS UPDATE.

- LEGEND – EXISTING**
- SPOT ELEVATION
 - INTERMEDIATE CONTOUR
 - INDEX CONTOUR
 - DEPRESSION CONTOUR
 - TREES AND TREELINE
 - STRUCTURE AND BUILDING
 - FENCE
 - POLE
 - ROADS
 - EDGE OF WATER
 - MANHOLES / CATCH BASIN
 - POWER POLE
 - TOWER

- LEGEND – PROPOSED**
- PROPOSED AREA 8 BOUNDARY
 - PROPOSED AREA 9 BOUNDARY
 - AREA 5 BOUNDARY
 - AREA 6 BOUNDARY
 - AREA 7 BOUNDARY
 - AREA 1-4 BOUNDARY
 - AREA 5 BOUNDARY
 - AREA 6 BOUNDARY
 - AREA 7 BOUNDARY

REFERENCE DRAWINGS

ISSUED FOR PERMIT

DATE: 11/27/07

SCALE: AS SHOWN

Hull
 HULL ENGINEERING & ARCHITECTURE
 11330
 11330
 11330

APPLICANT: MOUNTAINEER PLANT
 WEST VIRGINIA
 LITTLE BROAD RUN LANDFILL

PROJECT NO. 1-30130-05-A
 CIVIL ENGINEERING DIVISION
 SHEET 05

DESIGNED BY: [Signature]
 CHECKED BY: [Signature]
 DRAWN BY: [Signature]

AMERICAN ELECTRIC POWER
 1 INVERSIDE PLAZA
 COLUMBUS, OH 43215

APPENDIX B

Figure 3a, 3b, & 3c – Inspection Photographs Location Map

Landfill Inspection Photographs

Figure 3a – Inspection Photographs Location Map
Little Broad Run Landfill-Mountaineer Plant

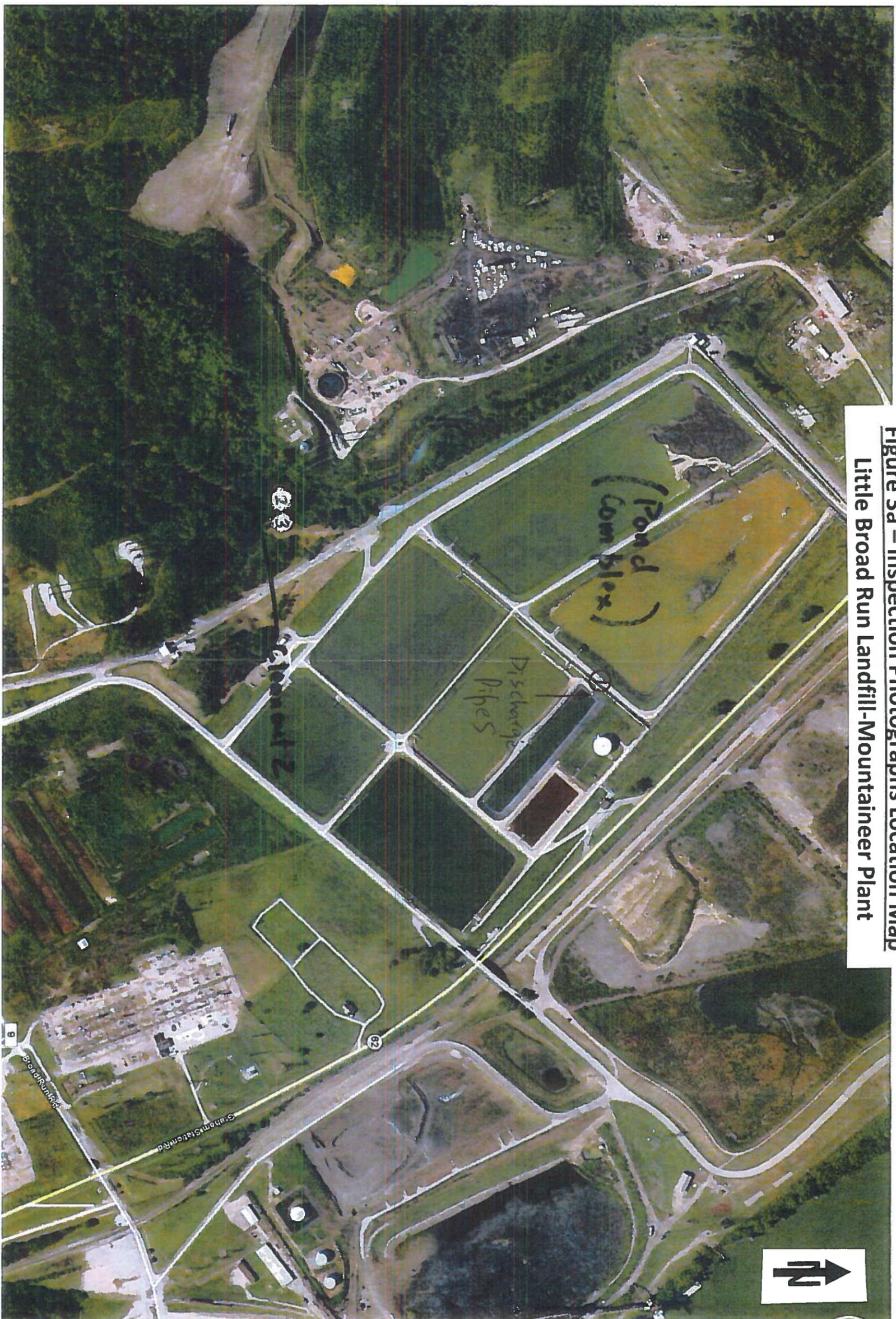


Figure 3b – Inspection Photographs Location Map
Little Broad Run Landfill-Mountaineer Plant



Figure 3c – Inspection Photographs Location Map
Little Broad Run Landfill-Mountaineer Plant



<p>Photo #1</p>	
<p>This photograph illustrates wastewater and landfill leachate discharge pipes.</p>	
<p>Photo #2</p>	
<p>Typical condition of the cleanout #2 and protective concrete manhole.</p>	
<p>Photo #3</p>	
<p>This photograph illustrates existing ground around the manhole.</p>	

Photo #4

This photograph illustrates cleanout #5 and good condition.



Photo #5

Leachate pond pumping system.



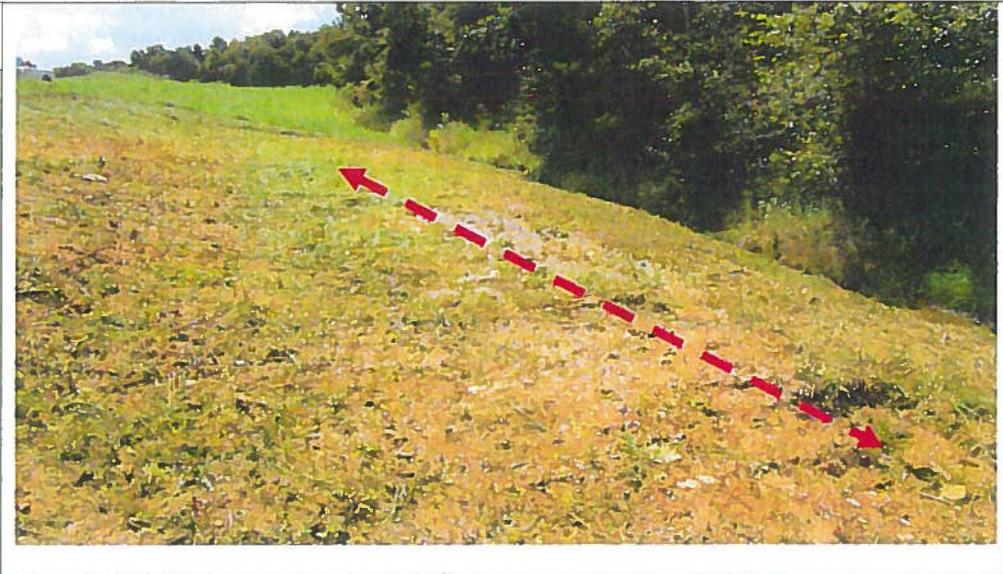
Photo #6

Typical condition of the Leachate pond.



<p>Photo #7</p>	
<p>Manhole #8</p>	
<p>Photo #8</p>	
<p>Manhole # 2A.</p>	
<p>Photo #9</p>	
<p>Sediment pond (addition) upstream of the outfall.</p>	

<p>Photo #10</p>	
<p>Original Sediment pond.</p>	
<p>Photo #11</p>	
<p>Outfall #024.</p>	
<p>Photo #12</p>	
<p>Area 3 seepage.</p>	

<p>Photo #13</p>	 A photograph showing a grassy slope. A red dashed arrow points from the upper right towards the lower left, indicating a direction of interest or a specific area on the slope. The vegetation is a mix of green and yellowish-brown grasses.
<p>Photo #14</p>	 A photograph of an outfall structure, identified as outlet #002. The structure is a concrete pipe or culvert partially buried in a bed of grey gravel. There is some green vegetation growing in front of the structure. In the background, there is a blue fence and a line of trees under a blue sky.
<p>Photo #15</p>	 A photograph of an outfall structure, identified as outlet #025. The structure is a concrete wall with two circular openings. It is surrounded by dense green vegetation and grass. The ground in front of the structure appears to be covered in gravel or crushed stone.

<p>Photo #16</p>	
<p>Typical condition of landfill Area 4 cover.</p>	
<p>Photo #17</p>	
<p>Overall typical condition of the landfill cover.</p>	
<p>Photo #18</p>	
<p>Minor vegetation growth was observed.</p>	

<p>Photo #19</p> <p>Northwest sediment pond.</p>	 A photograph of a sediment pond with green vegetation on the banks and a blue sky with white clouds reflected in the water.
<p>Photo #20</p> <p>Typical view of the landfill haul road and ditch.</p>	 A photograph showing a gravel haul road on the left and a grassy ditch on the right, extending into the distance under a blue sky with scattered clouds.
<p>Photo #21</p> <p>Overall view of the gypsum stacker pad.</p>	 A photograph of a large pile of gypsum with a stacker machine on top, set against a blue sky with white clouds. A fence with yellow posts is in the foreground.

Photo #22

Gypsum stockpile next to the sump.

