January 15, 2016 390/265831

Mr. Benjamin Wilburn, P.E.
Senior Engineer
Fossil and Hydro Support
Talen Generation, LLC
835 Hamilton Street, Suite 150
Allentown, PA 18101

**Subject: 2015 Annual (Initial) USEPA CCR Landfill Inspection Report**
**Montour Ash Disposal Area No. 3**

Dear Mr. Wilburn:

This letter report presents the findings of the 2015 annual inspection of the Montour Ash Disposal Area No. 3 Landfill (Landfill). This inspection was performed on October 21, 2015, by HDR Engineering, Inc. (HDR) in accordance with Contract 619843-C, Release No. 5, dated May 27, 2015. This initial annual inspection was conducted in accordance with the requirements of the United States Environmental Protection Agency (USEPA) 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 17, 2015 (CCR Final Rule).

## 1.0 Summary

The Landfill is an operating Coal Combustion Residual (CCR) landfill, which is owned and operated by Montour LLC, a division of Talen Energy (Talen). The Landfill is required to have an annual inspection, performed by a qualified engineer in accordance with the CCR Final Rule. The Landfill is also subject to regulation by the Pennsylvania Department of Environmental Protection (PADEP) and is classified as a Type II landfill (involving disposal of waste having an intermediate potential for adverse environmental and health effects). Although this is the initial inspection performed in accordance with the CCR Final Rule, Talen and its' predecessor, PPL, have inspected the Landfill in accordance with PADEP requirements since it began operation in 1991.

The CCR Final Rule requires that the annual inspection include the following elements:

- a review of available information to verify that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering standards;
- a visual inspection of the CCR unit to identify signs of distress or malfunction of the CCR unit; and
- a summary of CCR volumes and an assessment of changes in geometry.

***Design***

A review of available information indicates that Ash Disposal Area No. 3 was generally designed by PPL and constructed in accordance with good engineering standards that were recognized and generally accepted at the time of design and construction between the early 1980s, when design started, and 1991, when the landfill was placed in operation. The original design and operating plan and subsequent modifications were reviewed and approved by the PADEP prior to issuing permits. There have been changes in industry practice pertinent to the design of landfills since that time, including the addition of aquifer separation requirements and the design of leachate liner and leakage systems, though the CCR Final Rule does not require that modifications to existing CCR units be made to address changes in practice unless specifically noted.

The Landfill site was originally divided by a stream which has been diverted through two 48-inch-diameter pipes that pass through the center of the landfill. These pipes are currently covered by a small separation dike, but will eventually be buried beneath the center of the landfill. The long-term reliability of the diversion piping should be verified before permanent filling over the pipes takes place.

The Run-on Run-off Control Plan, as required by the CCR Final Rule, had not yet been prepared, so that the adequacy of the design of stormwater control measures could not be assessed.

***Construction***

PPL specifications called for full-time inspection and for a third-party construction summary report to be completed after each stage, and after completion of construction. Documentation of extensive testing was provided for review, though summary reports were not available for review.

***Operation and Maintenance***

Talen stated that the landfill is being operated and maintained in accordance with the permit requirements.

HDR identified several areas where minor maintenance or investigation activities with respect to the stormwater run off, leachate drainage, and liner systems are appropriate.

***2015 Visual Inspection***

No evidence of significant distress or malfunction was observed during the 2015 annual inspection. As noted above, HDR identified several areas where minor maintenance or investigation is appropriate with respect to the stormwater run off, leachate drainage, and liner systems.

***Geometry***

This is the initial inspection of the landfill conducted under the CCR Final Rule; therefore, there is no previous inspection with which to compare changes in geometry. Baseline conditions for use in future comparisons are provided in Section 2. As of the time of this inspection, approximately 1,141,000 tons of material had been landfilled in Cells A and B, about 56 percent of the capacity of Cells A and B, and 23 percent of the total landfill storage capacity of 4,992,221 tons for Cells A, B, C, and D.

***Recommendations***

Continued attention to the items noted below is appropriate to satisfy the CCR Final Rule inspection requirements for existing CCR landfills:

- Maintenance of the facility, including the stormwater run off, leachate drainage, and liner systems.
- Documentation of the Run-on Run-off Control Plan; and
- Assessment of the long-term reliability of the stream diversion piping before filling of Cells C and D takes place.

## 2.0 Project Description and History

The Landfill is located adjacent to the Montour Steam Electric Station (SES) in Derry Township, Montour County, Pennsylvania, at $41^{0}$3'47"N, $76^{0}$39'40"W. An aerial view of the Landfill can be seen in Photo 1 located in Appendix A. The Landfill was originally owned by PPL Montour, LLC (PPL). In June of 2015, the company changed their name to Montour, LLC, which is a division of Talen Energy (Talen).

The Landfill is divided into eastern and western segments by a small stream that originally flowed across the site. The stream has been diverted into two (2) 48-inch-diameter pipes. The first landfill level covers 50.6 acres and is divided into four disposal cells. Two disposal cells, A and B, totaling 28.9 acres, are on the east side of the stream enclosure pipes and the C and D disposal cells, totaling 21.7 acres, are on the west side of the stream enclosure pipes.

The liner system for Cells A and B was constructed in the late 1980s and early 1990s and was placed into service in February 1991. Approximately 56 percent of the storage capacity of Cells A and B, and 23 percent of the total landfill capacity has been filled. The liner system for Cells C and D has not been constructed, and no filling of Cells C and D has taken place.

Prior to construction of the liner system for Cells A and B, initial site work was performed, including construction of the stream diversion measures, the leachate/run off basin and associated drainage structures, and a groundwater drainage system along the west part of the Landfill. The intent of the groundwater drainage system is to maintain a 4-foot vertical separation between the groundwater surface and the base of the liner under normal operating

conditions, with provisions to ballast the lowest part of the liner with water if flooding results in a rise in the groundwater surface.

From the ground surface upwards, the landfill liner system in Cells A and B consists of:

- Stripped subgrade;
- 6 inches of bottom ash and sand bedding;
- 30 mil PVC membrane;
- 110 mil Type I geotextile over liner; and
- 24-inch bottom ash drainage blanket. Leachate collection piping consists of 4-inch perforated HDPE pipe bedded in stone, leading to 8 4-inch headers.

All landfill material is shaped to promote run off, spread in loose layers approximately 1-foot thick, and compacted. Permitted landfill material includes:

- Bottom ash;
- Fly ash;
- Coal mill rejects and soils containing pyrites; and
- Other industrial wastes as described in the permit.

The sides and bench of Cells A and B have been capped, with the cap consisting of 12 inches of topsoil and vegetative cover. The top surface has not been capped, but from the fill surface upwards, the landfill top cap will consist of:

- A 40 mil PVC membrane;
- 12 oz geotextile;
- 8 inches of bottom ash as a drainage layer;
- Geotextile filter;
- 6 inches of soil; and
- 12 inches of topsoil.

The leachate collection piping currently drains to an open ditch at the west edge of Cells A and B. The 6-inch leachate main header pipe shown on the drawings, to which the eight (8) 4-inch leachate lateral headers will connect, has not yet been installed. The ditch, which also conveys dirty stormwater run off, leads to the leachate run off basin where suspended material settles out before the run off is pumped to the plant's detention basin for treatment. Leachate discharged is estimated by visual monitoring of the headers.

### 2.1 Changes in Geometry Since the Previous Inspection

This is the initial inspection conducted under the CCR Final Rule; therefore, this evaluation will establish a baseline for future annual inspections.

### 2.2 Approximate Volume of CCR Contained in the Unit

**Table 1**
**Landfill Storage Areas and Volumes**

| Cell | Area Acres | Volume Cubic Yards | Volume Tons |
|---|---|---|---|
| A/B Current Status | Active: 28.9 | | 1,140,799 |
| A/B Total | 28.9 | 1,457,708 | |
| C/D | 21.7 | 2,098,005 | |
| Total | 50.6 | 3,555,713 | 4,992,221 |

Areas and volumes were calculated from the Design Concept Operating Plan, by PPL, Revision 11, March 20, 2007. Current and total tonnage volumes were taken from the 2014 PADEP annual operation report, with tonnage for 2015 based on reported scale weights.

## 3.0 Review of Supporting Technical Information

As required by the USEPA CCR Final Rule, the annual inspection is to include verification that the design, construction, operation, and maintenance of the Landfill are consistent with recognized and generally accepted good engineering standards at the time of design, approval, and construction between the late 1980s and 1991, though there are several areas where the original design is not consistent with current practice for construction of a new landfill.

***CCR Final Rule Compliance Documentation***

Talen established their CCR website, posted their fugitive dust control plan, continued required record keeping, provided required notifications, and implemented weekly inspections by October 19, 2015, in accordance with the CCR Final Rule.

Talen is preparing the Run-on Run-off Control Plan, to be completed by October 17, 2016.

Talen will be preparing the unstable area location restriction demonstration in accordance with the requirements of the CCR Final Rule by October 17, 2018.

The summaries listed above were not completed at the time of the preparation of this inspection report and were not available for review. Available supporting technical information that was reviewed included the following:

- Construction Drawings prepared by PPL, dated 1984 through 1986;
- Construction Specification prepared by PPL, PPC-2207 Site 5-6 Site Development Revision 4, dated February 12, 1987;
- Construction Inspection Specification by PPL, dated February, 1987;
- Design Concept Operating Plan by PPL, Revision 11, Dated March 20, 2007;
- Design Engineers Report by PPL, dated May 17, 1984;

- PADEP Permit Application (dated August 8, 2007) and Permit (dated August 29, 2007);
- Construction Test Results, dated 1986 through 1991;
- Drawing E376172, Sheet 1, Revision 6, 2015 Topographic Mapping; and
- Weekly Inspection Forms.

***Design Review***

The review of available information indicates that Ash Disposal Area No. 3 was designed and constructed in accordance with good engineering standards that were recognized and generally accepted at the time of design and construction between the late 1980s and 1991. The original design and subsequent modifications were reviewed and approved by PADEP. There have been changes in industry practice pertinent to the design of landfills since the time of the original design, including the addition of aquifer separation requirements and the design of leachate liner and leakage systems, though the CCR Final Rule does not require that modifications to existing CCR units be made to address changes in practice unless specifically noted.

The stormwater Run-on Run-off Control Plan and unstable area demonstrations are currently being developed and were not available for review. Comments pertaining to the design review are noted below.

The Landfill site was originally divided by a stream which has been diverted through two, 48-inch-diameter HDPE, Class 160 bell and spigot pipes that pass through the center of the landfill. These pipes are currently covered by a small separation dike, but will eventually be buried beneath the center of the landfill if filling of Cells C and D takes place. Deterioration of piping passing under a CCR unit resulted in a significant environmental incident at a project in North Carolina in 2014. The long-term reliability of the diversion piping should be verified before permanent filling over the pipes takes place.

The overflow spillway in the run off/leachate basin, as well as the adjacent railroad tracks, did not appear on the landfill drawings. The Run-on Run-off Control Plan currently being developed should include an assessment of the overflow spillway.

***Construction***

PPL specifications called for full-time inspection and for a third-party construction summary report to be completed after each stage, and after completion of construction. Documentation of extensive testing was provided for review, though summary reports were not available for review. The inspection specification did not call for the inspector to be a professional engineer, as is currently called for by PADEP.

***Operation***

Talen is currently placing about 200 tons of material per week within the Landfill. Talen, and their current operations subcontractor, Trans Ash, Inc., stated that they were operating and maintaining the Landfill in accordance with permit requirements and design drawings describing, among other things, fill placement and dust control measures.

As noted below, several minor maintenance issues were identified, including possible issues with the liners, leachate, and run-on run-off control measures as discussed below.

An assessment of the groundwater monitoring program, sampling, analysis, and detection, as described by the CCR Final Rule, is not a required element of the visual inspection and was not included in this inspection report.

## 4.0 Visual Inspection Site Visit

The visual inspection site visit was conducted on October 21, 2015, by Adam Jones, P.E. and Nicholas Dempsey, E.I.T. of HDR. Benjamin Wilburn, P.E. of Talen accompanied HDR during part of the inspection. The weather during the inspection was clear with temperatures between 65 and 75 degrees. No rain occurred during the 48 hours prior to the inspection.

An aerial photograph of the site, relevant photographs from the inspection, and a key plan are provided in Appendix A.

The landfill appeared to be in good condition overall. There was no evidence of actual or potential significant structural weakness of the Landfill, or any conditions that were significantly disrupting or having the potential to significantly disrupt the safety of the Landfill, although several items requiring further investigation or maintenance were identified as noted below. Overall views of the Landfill can be seen in Photos 2 through 5.

A perimeter swale extends around the entire Landfill and drains to the leachate/run off basin. Thick vegetation along the west, east, and north perimeter swales, seen in Photos 2, 4, and 5, as well as along the entire bench at approximate elevation 539 feet, will likely retard flow and reduce the hydraulic capacity of the system with respect to the design calculations. The effect of the vegetation currently growing in the swales should be checked with respect to the assumptions in the calculations and what was shown on the drawings, and cut as necessary. Debris and irregularities within the swales, particularly along the east and north swales, should be cleared. This includes a number of erosion rills along both banks of the east perimeter swale.

A number of woodchuck burrows were observed at the northwest toe of the Landfill, adjacent to the chain link fence, seen in Photos 6 and 7. These burrows appear to go both over and either under or through, the Landfill liner. Although this could not be confirmed, it appeared that the edge of the liner was exposed and that the swale along the north end of the landfill, which conveys contaminated run off, referred to as “dirty run off” on the drawings, was located

outside of the limits of the liner. There were no visible markers showing the location of the edge of liner in this area. The location of the perimeter of the liner should be verified and marked, and the location of the liner with respect to the swale verified. Vegetation should be cut to remove cover for burrowing animals. The liner should be exposed, its condition assessed, repaired if necessary, and covered. The liner should be extended under the north perimeter swale, if it does not already.

The liner was exposed at the south end of the west perimeter swale, adjacent to the first leachate drain outfall, as seen in Photo 8. There was evidence of heavy deer traffic at this location, with the potential to damage the liner. The liner should be inspected, repaired if necessary, and covered to protect it.

A subcontractor was actively trapping woodchucks, and a number of animals and burrows were observed during the inspection, though waist-high vegetation on the landfill slopes obscured the ground surface. Removal of woodchucks should be continued to prevent damage to the liner or the cap. Trimming vegetation at the site, at least along the toe where the liner cover is shallow, would reduce cover for burrowing animals, making them less likely to remain on site and easier to trap.

The access road to the active fill area can be seen in Photo 9. It appeared that contaminated stormwater run off from a heavy rainstorm could flow down the access road, across the entrance ramp at the east end of Cells 1 and 2, across the adjacent paved road, and into an existing clean water swale. The area draining to the access road is fairly large, the road is steep, and the rock check dams along the road did not appear to have adequate capacity to check flow from a heavy rain. The potential for run off to exit the landfill should be checked and the road access ramp and perimeter swale re-graded as necessary inside the landfill, so that discharge will be fully contained.

Culverts for the perimeter swale are located at the southeast corner of the Landfill, under the access road ramp, at the northeast corner of the Landfill and extending under the conveyor building, seen in Photo 10. Each of these culverts was partially obstructed with vegetation or riprap, or was damaged. These should be cleared, repaired, and maintained. The size of all of the culverts should be checked. The culverts are not shown on the drawings and may have been installed without consideration of the required hydraulic capacity. The 12-inch-diameter culvert at the northeast corner appears to be significantly undersized.

The concrete-lined perimeter channel at the south end of the cell conveys both clean and contaminated run off. The concrete lining was recently replaced over much of this channel. Several of the joints between sections were poorly formed and will likely require repair in the near future to remain watertight. Two 48-inch-diameter pipes convey stormwater run off from the top of the Landfill to this swale. Neither outfall has any energy dissipation measures, so extreme flows would likely spill out of the swale and across the road.

A slope irregularity was observed above the bench at the southeast corner of Cell A, which is also seen in the aerial photogrammetry. While there was no evidence of instability in this area,

the reason for this irregularity should be determined to verify that it is not associated with a slope stability issue.

The leachate collection system under Cells A and B consists of 4-inch-diameter, perforated HDPE pipe with 8 separate outfalls, an example of which can be seen in Photo 11. The leachate drain pipes discharge to a swale leading to the leachate/run off basin. The 6-inch-diameter leachate collection header pipe shown on the Drawings has not yet been constructed, since filling of Cells C and D has not yet started. Trans Ash reportedly checks each available outfall for evidence of drainage weekly, though no documentation was available for review. The following observations were made with respect to the leachate collection pipe outfalls. In this report, the pipe outfalls, referred to as drains below, start with the southernmost outfall referred to as Drain 1.

- Drain 1 had steady flow of approximately 1 gallon per minute (gpm), some debris had accumulated at the end of the pipe. The debris should be cleared.
- Drain 2 was dry, and the animal guard was missing. The guard should be replaced.
- Drain 3 was dry, and the end of the pipe had been damaged. The end of the pipe should be protected against further damage.
- Drain 4 had no flow, the animal guard was missing, the pipe interior appeared to be damaged and appeared to be plugged, as seen in Photo 12. The outfall should be inspected, cleaned, and repaired.
- Drain 5 had steady, clear flow less than 1 gpm.
- Drain 6 was dry, had some sediment in the pipe, and the marker was broken. The marker should be replaced.
- Drain 7 was wet with no flow and no debris.
- Drain 8 could not be located, there was no marker, and the drain outfall appeared to have been buried. The outfall should be located, marked, and a channel to the ditch established.

The active surface of Cells A and B was well maintained, with fill shaped and compacted to provide drainage and reduce infiltration, as seen in Photo 13. A caking agent had been applied in areas to prevent dusting.

The liners have not been constructed at Cells C and D, and this area is overgrown with grass and low brush, as seen in Photo 14. The leachate run off basin can be seen in Photo 15.

A number of small depressions were observed in the floor of the leachate run off basin, seen in Photo 16. The cause of these depressions and their impact on the leachate collection system should be assessed.

The leachate run off basin area has a number of manholes and hydraulic structures, some of which will remain inactive until the piping associated with activation of Cells C and D is installed. Labeling these structures and entrance and exit piping will simplify future inspections. The groundwater underdrain system is installed under the culvert diversion ditch, and the riser can be seen in Photo 17. The ditch was heavily overgrown so that the discharge to the groundwater drain could not be viewed. The stream diversion pipes had animal barriers on the downstream ends. These could catch trash flowing through the pipes and create a blockage. Alternate animal barriers should be provided, or breakaway barriers used to prevent accidental blockage of the channel.

## 5.0 Closure

This annual inspection was conducted in accordance with the requirements of the United States Environmental Protection Agency (USEPA) 40 CFR Parts 257 and 261 Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 17, 2015 (CCR Final Rule). HDR appreciates the opportunity to perform this work for Talen. If you have any questions or comments, please contact us.

Sincerely,

HDR ENGINEERING, INC.


1/15/2016

Adam N. Jones, P.E.
Senior Engineer

ANJ/cw

Appendix A: Inspection Photographs

# APPENDIX A
# INSPECTION PHOTOGRAPHS

**LEGEND**

CONTOUR (2 FT.)

0 100 200

Feet

MAP INFORMATION WAS COMPILED FROM THE BEST AVAILABLE PUBLIC SOURCES. NO WARRANTY IS MADE FOR ITS ACCURACY AND COMPLETENESS.

# MONTOUR

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DECEMBER 2015

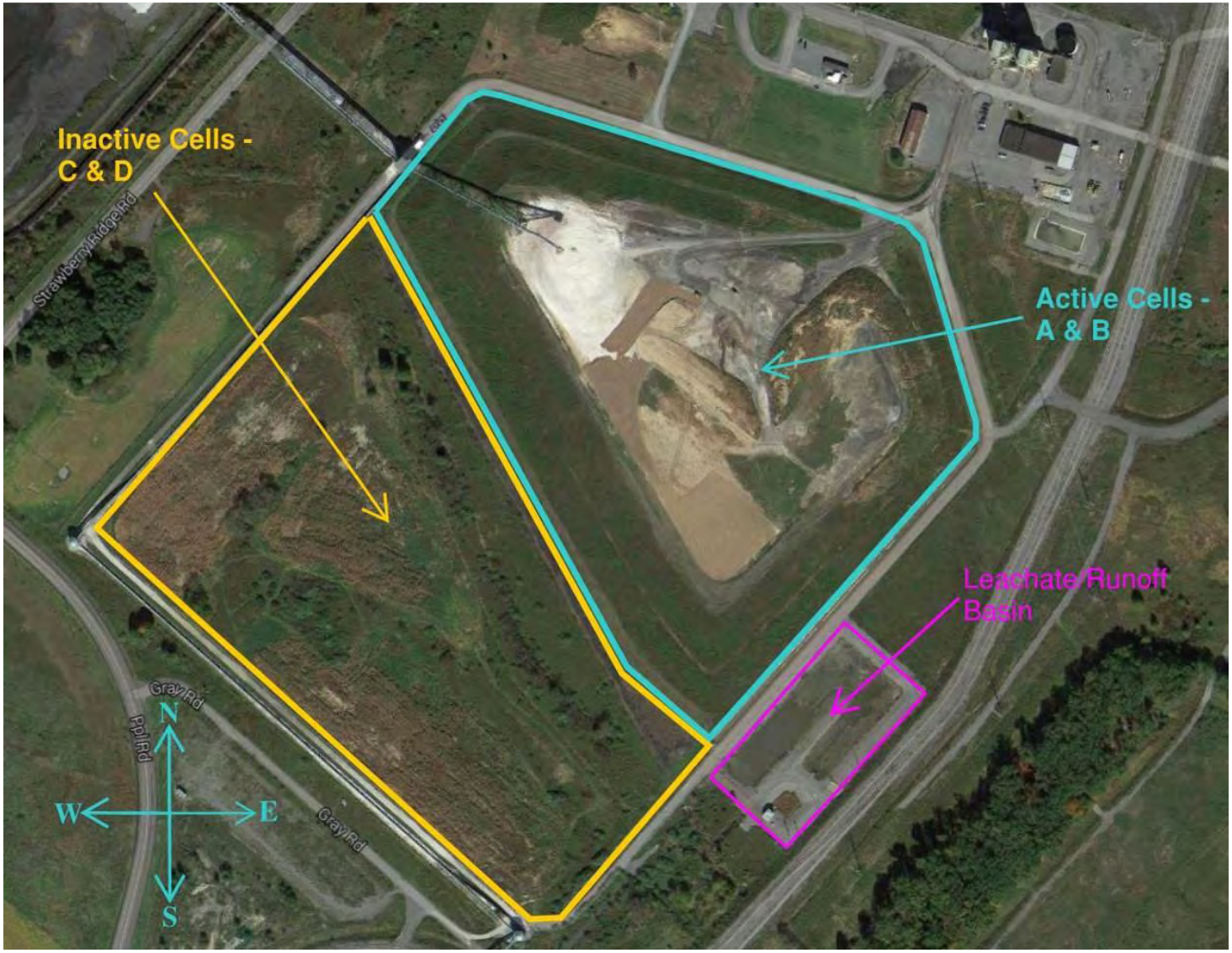

Photo 1 - Aerial view of Montour Ash Area No. 3. Cells A and B, which are actively being filled, can be seen in the center. Construction of Cells C and D has not yet started.

Photo 2 – West edge of Active Cells A and B. The berm to the left of the photo separates active Cells A-B from Cells C-D, which have not yet been constructed. The berm overlies the two 48-inch pipes that divert an existing stream through the Landfill footprint.

Photo 3 – Southwest corner of Cell A.

Photo 4 – East side of Cells A and B, showing heavy vegetation.

Photo 5 – North end of Cell B. The conveyor building, constructed after the Landfill, straddles the north dirty water perimeter swale.

Photo 6 – Toe of the Landfill at the northwest corner, looking east. Several woodchuck holes were observed in the tall grass adjacent to the chainlink fence, which appeared to have exposed the edge of the liner. The dirty water swale at the north end is located to the left (north) of the chain link fence and may be beyond the limits of the liner.

Photo 7 – Exposed geotextile and liner at woodchuck burrows near the northwest toe of the Landfill.

Photo 8 – Exposed liner at the south end of the west perimeter swale, adjacent to the first leachate drain outfall. Heavy deer traffic in this area could potentially penetrate the liner.

Photo 9 – Access road, looking east. Erosion control measures did not appear to be capable of preventing stormwater runoff from flowing down the road and out of the Landfill.

Photo 10 – Obstructed culvert passing under the conveyor building.

Photo 11 – Leachate Drain No. 7 outfall with animal guard.

Photo 12 – Damage and plugging of the outfall of Leachate Drain No. 4.

Photo 13 – Working Landfill surface showing shaped, compacted fill, dust-protection caking agent, and temporary grass cover beyond.

Photo 14 – Inactive Cells C and D, looking west.

Photo 15 – Leachate runoff basin, looking south.

Photo 16 – Depressions in the clay liner of the leachate runoff basin.

Photo 17 – Groundwater underdrain riser pipe, visible from the stream diversion outfall structure.