AECOM

Submitted to
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(SIGECO)
dba CenterPoint Energy
Indiana South (CEIS)
211 Northwest Riverside
Drive, Evansville, IN 47708

Submitted by
AECOM
9400 Amberglen Boulevard
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October 13, 2021

CCR Certification:

Inflow Design Flood Control System Plan

§257.82

for the

Sedimentation Pond

at the

A.B. Brown Generating Station

Revision 0

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Executive Summary

This Coal Combustion Residuals (CCR) Inflow Design Flood Control System Plan (Inflow Flood Control Plan) for the Sedimentation Pond at the Southern Indiana Gas & Electric Company, dba CenterPoint Energy Indiana South (CEIS)., A.B. Brown Generating Station has been prepared in accordance with the requirements specified in the USEPA CCR Rule under 40 Code of Federal Regulations §257.82 (a). The CCR Rule required that the specified documentation, assessments and plans for an existing CCR surface impoundment be prepared by October 17, 2016. These regulations also require that the specified documentation and assessments for an existing CCR surface impoundment be prepared within five years of the placement of the previous assessment in the facility's operating record.

This Inflow Flood Control Plan meets all requirements as summarized in **Table ES-1.**

Table ES-1 – Certification Summary

Report Section	CCR Rule Reference	Requirement Summary	Requirement Met?	Comments
Inflow Design Flood Control System Plan				
4.1	§257.82 (a)(1)	*Adequately manage flow into the CCR unit during and following the peak discharge of the inflow design flood*	Yes	CCR unit has the storage capacity to handle the inflow design flood
4.2	§257.82 (a)(2)	*Adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood*	Yes	The outlet devices of the CCR unit control the peak discharge from the inflow design flood
4.3	§257.82 (a)(3)	*Required Inflow design flood for Incised Impoundment*	Yes	Inflow design flood utilized was the 25 year event
4.4	§257.82 (b)	*Discharge handled in accordance with* §257.3 – 3	Yes	CCR unit discharges in accordance with the existing NPDES permit

The Sedimentation Pond is an incised impoundment, hence a hazard potential classification was not performed. Hence, per §257.82 (a)(3), the inflow design flood is the 25-year flood for an incised impoundment. In accordance with the requirements of §257.82 (a)(3), an Inflow Flood Control Plan was developed for the Sedimentation Pond.

This was accomplished by evaluating the effects of a 24-hour duration design storm for the 25-year Inflow Design Flood (IDF) to evaluate the Sedimentation Pond's ability to collect and control the 25-year IDF of 5.65 inches, under existing operational and maintenance procedures.

The results for the Sedimentation Pond indicate that the CCR unit has sufficient storage capacity and outlet devices to adequately manage inflows and collect and control outflows during peak discharge conditions created by the 25-year IDF.

1 Introduction

1.1 Purpose of This Report

The purpose of the Inflow Design Flood Control System Plan (Inflow Flood Control Plan) is to document that the requirements specified in 40 Code of Federal Regulations (CFR) §257.82 have been met to support the certification required under each of the applicable regulatory provisions for the A.B. Brown Generating Station Sedimentation Pond. The Sedimentation Pond is an existing coal combustion residuals (CCR) surface impoundment as defined by 40 CFR §257.53. The CCR Rule required that the specified documentation, assessments and plans for an existing CCR surface impoundment be prepared by October 17, 2016. These regulations also require that the specified documentation and assessments for an existing CCR surface impoundment be prepared within five years of the placement of the previous assessment in the facility's operating record.

The A.B. Brown Station has a Type III Restricted Waste Site (RWS) Landfill facility that is utilized for the disposal of Flue Gas Desulfurization (FGD) residuals, which includes calcium sulfite with potentially trace contents of fly ash, and bottom ash. The Sedimentation Pond currently collects and stores runoff solely from this Landfill facility. The following table summarizes the documentation required within the CCR Rule and the sections that specifically respond to those requirements of this plan.

Table 1-1 – CCR Rule Cross Reference Table		
Report Section	**Title**	**CCR Rule Reference**
4.1	Inflow Analysis	§257.82 (a)(1)
4.2	Outflow Analysis	§257.82 (a)(2)
4.3	Inflow Design Flood	§257.82 (a)(3)
4.4	Discharge handled in accordance with *§257.3 – 3*	§257.82 (b)

Analyses completed for the hydrologic and hydraulic assessments of the Sedimentation Pond are described in this report. Data and analyses results in the following sections are based on spillway design information shown on design drawings, topographic surveys, information about operational and maintenance procedures provided by Southern Indiana Gas & Electric Company (SIGECO), dba CenterPoint Energy Indiana South (CEIS), and limited field measurements collected by AECOM. The analysis approach and results of the hydrologic and hydraulic analyses presented in the following sections were used by AECOM to confirm that the Sedimentation Pond meets the hydrologic and hydraulic capacity requirements of the rules referenced above for CCR surface impoundments.

1.2 Brief Description of Impoundment

The A.B. Brown Station is a coal-fired power plant located approximately 10 miles east of Mount Vernon in Posey County, Indiana and is owned and operated by SIGECO. The station is situated just west of the Vanderburgh-Posey County line and north of the Ohio River with the Sedimentation Pond positioned on the north side of the generating station.

The A.B. Brown Station operates a Type III Restricted Waste Site CCR landfill, and stormwater from the landfill is managed via a perimeter ditch system. One of the reaches of the perimeter ditch system collects and conveys contact flow from the southern end of the landfill in a clockwise direction to the lined Sedimentation Pond. The Sedimentation Pond, constructed in 2015, is approximately 1.3 acres in size, and manages and treats contact stormwater and water that drains from the waste produced from the active cell portions of the landfill. The liner system for the Landfill Sedimentation Pond consists of an 80 mil geomembrane covered with a 16 ounce non-woven geotextile, underlining a geogrid and 6 inches of #9 crushed stone over the entire geogrid. The pond liner is overlain with a layer of 6 inch D_{50} rip rap. Supernatant from the Landfill Sedimentation Pond is conveyed to the Capital Pond via an overflow pipe.

1.2.1 Inflow from Plant Operations and Stormwater Runoff

The Sedimentation Pond will be operational through the life of the Type III Restricted Waste Site CCR landfill. The primary purpose of the Sedimentation Pond is to receive water that drains from the waste and contact stormwater runoff from the landfill. The Sedimentation Pond discharges to a collection manhole via an 18” CMP pipe during normal operating conditions. No process water discharge from the A.B. Brown Station is conveyed to the Sedimentation Pond.

Upstream areas that contribute runoff are captured by the Stormwater Runoff Pond to the north. Approximately 41.6 acres of the active landfill area drain to the Sedimentation Pond.

1.2.2 Outlet Structures

The Sedimentation Pond has two outlet devices, one acting as the primary outlet device and the other acting as a secondary outlet device. The primary outlet device is located on the northern embankment of the Sedimentation Pond. It is a 24-inch diameter HDPE riser pipe inlet with staggered slots and has an overflow invert elevation of 400.0 feet. The riser inlet connects to an 18-inch diameter HDPE pipe at an invert elevation of 397.50 feet that discharges into the collection manhole. The slots on the riser are located at a spacing of 1-foot center to center along the riser’s length. The secondary outlet device is a flat bottom broad crested rectangular weir that is 220 feet long, 20 feet wide and has an invert elevation of 404.0 feet. The total length of the weir is approximately 850 feet.

2 Hydrologic Analysis

2.1 Design Storm

The Sedimentation Pond is an incised impoundment; hence a hazard potential classification was not performed. Hence, per §257.82 (a)(3), the inflow design flood is the 25-year flood for an incised impoundment. In accordance with the requirements of §257.82 (a)(3), an Inflow Flood Control Plan was developed for the Sedimentation Pond which indicates that the inflow design flood is the 25-year return frequency design storm event.

2.2 Rainfall Data

The rainfall information used in the analysis was based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 which provides rainfall data for storm events with average recurrence intervals ranging from 1 to 1,000 years and durations ranging from 5 minutes to 60 days. The design storm rainfall depth, obtained from the NOAA website, is 5.65 inches for the 25-year, 24-hour storm. The Indiana Huff Third Quartile rainfall distribution used by AECOM is appropriate to use for storms up to the 1,000-year, 24-hour flood at the project site.

2.3 Runoff Computations

The drainage areas for the Sedimentation Pond were determined using a computer-aided design (CAD) analysis of topographic surveys completed in 2018. Approximately 41.6 acres of the active landfill area drain to the Sedimentation Pond. The impoundment receives rain that falls directly into the pond; however, there are no other upstream areas that contribute runoff to the impoundment. See **Figure 3** in **Appendix A** for the Drainage Area Maps.

Runoff was calculated using the SCS Curve Number Method, where curve numbers (CN) were assigned to each subcatchment based on the type of land cover and soil type present. Using the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, the soil type of the site was determined to be a mixture of soil types AIE, AIC3, UnB2 and Ud. The hydrologic soil group associated with each soil type was used. The soil survey listed soils AIE and AIC3 as Hydrologic Soil Group B and UnB2 and Ud as Hydrologic Soil Group C. CN values for the land cover were selected from the CN Table available in HydroCAD. This data was obtained from the SCS NRCS Technical Release-55 (TR-55) publication. Areas that were classified as Hydrologic Soil Group C had 50-75% Grass Cove and determined to have a CN value of 79. Areas that were classified as Hydrologic Soil Group B had <50% Grass Cover and 50%-75% Grass Cover and their CN values were determined to be 79, and 69 respectively. The water surface was determined to have a CN value of 98.

The time of concentration is commonly defined as the time required for runoff to travel from the most hydrologically distant point to the point of collection. Calculations for the time of concentration for each sub-watershed were performed in HydroCAD and are included in **Appendix B**.

Stormwater runoff from the 25-year rain event into the Sedimentation Pond has an inflow of 15.30 cfs and inflow volume of 10.94 acre-feet. Refer to **Appendix B** for HydroCAD results.

3 Hydraulic Analyses

3.1 Process Flows

The Sedimentation Pond's primary purpose is to collect and store runoff and water that drains from the waste areas from the Type III Restricted Waste Landfill facility. No additional flows from the surrounding area or the A.B. Brown Station process flows enter the Sedimentation Pond.

3.2 Storage Capacity

The storage volumes for the Sedimentation Pond were determined using a computer-aided design (CAD) analysis of topographic surveys completed in 2018. The volume of storage was calculated by estimating the incremental storage area present for multiple elevations within the updated topographic surface supplied by SIGECO representatives. The incremental storage area was input as a prismatic storage to develop incremental storage volumes which was then used to calculate a cumulative storage volume in HydroCAD. The volume of storage within the Sedimentation Pond from normal pool elevation of 397.50 feet to the top of embankment elevation of 404.0 feet is 5.53 acre-feet. Although the water surface elevation normally operates at an elevation of 397.50 feet, the water surface level can fluctuate. For the purpose of this hydraulic analysis, the water surface elevation was assumed to be steadily maintained at an operating level of 397.50. Refer to **Appendix B** for further storage volume details.

3.3 Discharge Analysis

A hydraulic model was created in HydroCAD 10.00 to assess the capacity of the pond to store and convey the storm flows. HydroCAD has the capability to evaluate each pool within the network, to respond to variable tailwater, pumping rates, permit flow loops, and reversing flows. HydroCAD routing calculations reevaluate the pond's discharge capability at each time increment, making the program an efficient and dynamic tool for this evaluation.

The analyzed scenario assumes a starting water surface elevation of 397.50 feet with its uppermost embankment at 404.0 feet. The peak elevation caused by the 25-year rain event is 401.04 feet. Therefore, the facility does not cause a discharge of pollutants into waters of the United States and is in compliance with the requirements of the NPDES under section 402 of the Clean Water Act.

4 Results

The hydrologic and hydraulic conditions of the Sedimentation Pond were modeled with the peak discharge of the 25-year storm event.

Regulatory Citation: 40 CFR §257.82 (a);

- *The owner or operator of an existing or new CCR surface impoundment or any lateral expansion of a CCR surface impoundment must design, construct, operate, and maintain an inflow design flood control system as specified in paragraphs (a)(1) and (2) of this section.*

4.1 Inflow Analysis

Regulatory Citation: 40 CFR §257.82 (a);

- *(1) The inflow design flood control system must adequately manage flow into the CCR unit during and following the peak discharge of the inflows design flood specified in paragraph (3).*

Background and Assessment

Runoff to the impoundment from the active landfill area is the total inflow to the Sedimentation Pond. Using the HydroCAD model, the total inflow was stored and routed through the outlet devices of the Sedimentation Pond to determine the peak water surface elevations.

Table 4-1 summarizes the water surface elevations of the Sedimentation Pond prior to and after the inflow design flood.

Table 4-1 - Summary of Hydrologic and Hydraulic Analysis 25-Year, 24-Hour Storm				
CCR Unit	Beginning WSE[1] (feet)	Peak WSE (feet)	Top of Embankment Elevation (feet)	Freeboard Above Peak WSE (feet)
Sedimentation Pond	397.50	401.04	404.0	2.96
Notes: [1] WSE = Water Surface Elevation used for hydraulic analysis				

Conclusion and Recommendation

No modifications are necessary or recommended to this unit for compliance with the CCR Rule.

As there is adequate storage within the Sedimentation Pond to manage the inflow design flood as well as the process flow from the plant, there is no anticipated overtopping of the Sedimentation Pond embankment, which meets the requirements in §257.82 (a)(1).

4.2 Outflow Analysis

Regulatory Citation: 40 CFR §257.82 (a);

- *(2) The inflow design flood control system must adequately manage flow from the CCR unit to collect and control the peak discharge resulting from the inflow design flood specified in paragraph (3) of this section.*

Background and Assessment

Runoff to the impoundment arises from the Type III Restricted Waste Site Landfill facility to produce the total inflow to the Sedimentation Pond. Using the HydroCAD model, the total inflow was stored and routed through the outlet devices of the Sedimentation Pond to determine the peak flowrate and velocity through the outlet devices.

Table 4-2 summarizes the peak flowrates and velocities through each of the outlet devices.

Table 4-2 - Summary of Outlet Devices 25-Year, 24-Hour Storm				
Outlet Device	Type and Size	Invert Elevation (feet)	Peak Flowrate (cfs)	Velocity at Peak Flowrate (fps)
Riser Pipe	18” HDPE	397.50	13.55	7.67
Top of Embankment	20’ wide crested rectangular weir	404.0	-	-

Conclusion and Recommendation

No modifications are necessary or recommended to this unit for compliance with the CCR Rule.

As the Sedimentation Pond outlet devices manage the discharge of the inflow design flood and the runoff and waste drainage flows from the Type III Restricted Waste Site Landfill without the peak water surface elevation overtopping the Sedimentation Pond embankment, the pond meets the requirements in §257.82 (a)(2).

4.3 Inflow Design Flood

Regulatory Citation: 40 CFR §257.82 (a);

- *(3) The inflow design flood is:*
    - *(i) For a high hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the probable maximum flood;*
    - *(ii) For a significant hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the 1,000-year flood;*
    - *(iii) For a low hazard potential CCR surface impoundment, as determined under §257.73(a)(2), the 100-year flood; or*
    - *(iv) For an incised CCR surface impoundment, the 25-year flood.*

Background and Assessment

The calculations for the inflow design flood are based on the hazard potential given to the impoundment. The different classifications of the impoundment hazard potential are high, significant, and low. A hazard potential classification is not required if the impoundment is incised.

Conclusion and Recommendation

As the impoundment was incised, the 25-year design storm was utilized in the analysis, which meets the requirements in §257.82 (a)(3).

4.4 Discharge

Regulatory Citation: 40 CFR §257.82 (b);

- *Discharge from the CCR unit must be handled in accordance with the surface water requirements under: §257.3 – 3.*

Background and Assessment

The discharge for the Sedimentation Pond goes to the Collection Manhole which eventually drains to the Capital Pond to the north. Since the Sedimentation Pond doesn't drain directly to a permitted NPDES outfall and does not release environmental contaminants to the waters of the United States it meets the requirements under section 402 of the Clean Water Act to meet the CCR rule.

Conclusion and Recommendation

No modifications are necessary or recommended to this unit for compliance with the CCR Rule.

5 Conclusions

The Inflow Flood Control Plan of the Sedimentation Pond adequately manages flow into the CCR unit during and following the peak discharge of the 25-year frequency storm event inflow design flood. The inflow design flood control system of the Sedimentation Pond adequately manages flow from the CCR unit to collect and control the peak discharge resulting from the 25-year frequency storm event inflow design flood. Therefore, the Sedimentation Pond meets the requirements for certification.

The contents of this report, specifically **Section 1** through **Section 4**, represent the Inflow Design Flood Control System Plan for this site.

6 Certification

This Certification Statement documents that the Sedimentation Pond at the A.B. Brown Generating Station meets the Inflow Design Flood Control System Plan requirements specified in 40 CFR §257.82. The Sedimentation Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule required that the specified documentation, assessments and plans for an existing CCR surface impoundment be prepared by October 17, 2016. These regulations also require that the specified documentation and assessments for an existing CCR surface impoundment be prepared within five years of the placement of the previous assessment in the facility's operating record.

CCR Unit: Southern Indiana Gas & Electric Company; A.B. Brown Generating Station; Sedimentation Pond

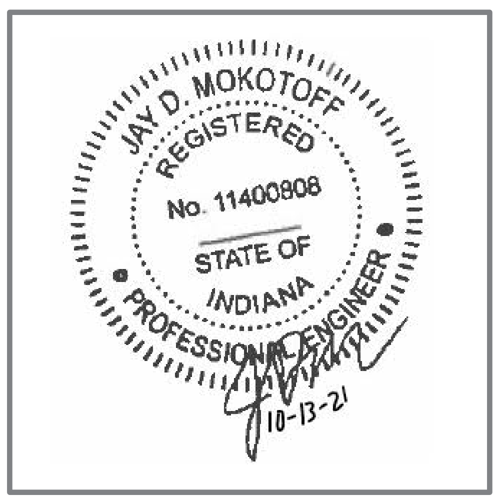
I, Jay Mokotoff, being a Registered Professional Engineer in good standing in the State of Indiana, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the Inflow Design Flood Control System Plan dated October 13, 2021 meets the requirements of 40 CFR § 257.82.

Jay Mokotoff

Printed Name

10-13-2021

Date



7 Limitations

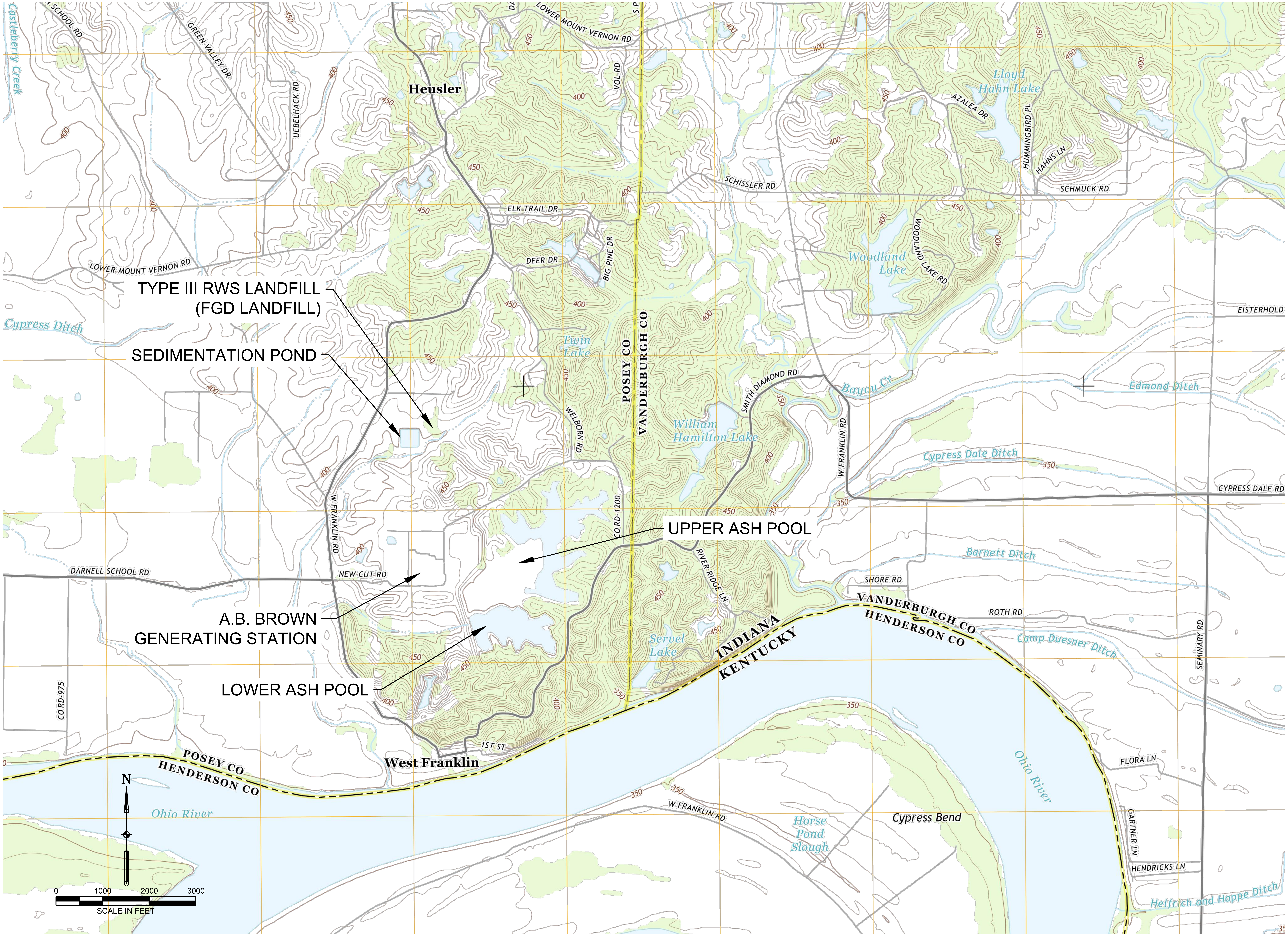
Background information, design basis, and other data have been furnished to AECOM by SIGECO, which AECOM has used in preparing this report. AECOM has relied on this information as furnished, and is not responsible for the accuracy of this information. Our recommendations are based on available information from previous and current investigations. These recommendations may be updated as future investigations are performed.

The conclusions presented in this report are intended only for the purpose, site location, and project indicated. The recommendations presented in this report should not be used for other projects or purposes. Conclusions or recommendations made from these data by others are their responsibility. The conclusions and recommendations are based on AECOM's understanding of current plant operations, maintenance, stormwater handling, and waste handling procedures at the station, as provided by SIGECO. Changes in any of these operations or procedures may invalidate the findings in this report until AECOM has had the opportunity to review the findings, and revise the report if necessary.

This hydrologic and hydraulic analysis was performed in accordance with the standard of care commonly used as state-of-practice in our profession. Specifically, our services have been performed in accordance with accepted principles and practices of the geological and geotechnical engineering profession. The conclusions presented in this report are professional opinions based on the indicated project criteria and data available at the time this report was prepared. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation is intended.

While the CCR unit adequately manages the inflow design flood, SIGECO must perform routine maintenance on the CCR unit to continually manage flood events without failure. Outlet devices should be cleared of debris that could block or damage the device. Pipes and intake structures should be monitored and repaired if deterioration or deformation occurs. All grass lined slopes should be examined for erosion and repaired if damaged. Rip-rap lined channels should be inspected for stones that have shifted or bare spots that have formed. Replace rip-rap as needed.

Appendix A
Figures



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A.B. BROWN GENERATING STATION
MT. VERNON, IN

IDF CERTIFICATION
SEDIMENTATION POND

ISSUED FOR CERTIFICATION

ISSUED FOR BIDDING ______ DATE BY

ISSUED FOR CONSTRUCTION ______ DATE BY

REVISIONS

NO.	DESCRIPTION	DATE
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AECOM PROJECT NO:	60442676
DRAWN BY:	AG
DESIGNED BY:	AG
CHECKED BY:	JMM
DATE CREATED:	
PLOT DATE:	12/15/2018
SCALE:	AS SHOWN
ACAD VER:	2014

SHEET TITLE

LOCATION MAP

FIGURE 1

GOVINDARAJAN, ASHWIN, 12/13/2018 10:26 AM

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A.B. BROWN GENERATING STATION
MT. VERNON, IN

IDF CERTIFICATION
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SHEET TITLE

SITE MAP

FIGURE 2

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IDF CERTIFICATION
SEDIMENTATION POND

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DRAINAGE AREA MAP

FIGURE 3

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Appendix B
Hydrologic and Hydraulic Calculations

NOAA Precipitation Data
Soils Data
HydroCAD Output

NOAA Precipitation Data

NOAA Atlas 14, Volume 2, Version 3
Location name: Newburgh, Indiana, US*
Latitude: 37.9163°, Longitude: -87.3369°
Elevation: 394 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.382 (0.347-0.418)	0.450 (0.411-0.494)	0.530 (0.483-0.581)	0.595 (0.541-0.652)	0.677 (0.612-0.740)	0.742 (0.668-0.810)	0.802 (0.718-0.875)	0.868 (0.774-0.948)	0.953 (0.843-1.04)	1.02 (0.896-1.12)
10-min	0.596 (0.542-0.653)	0.706 (0.644-0.775)	0.831 (0.758-0.911)	0.925 (0.840-1.01)	1.04 (0.945-1.14)	1.14 (1.02-1.24)	1.22 (1.10-1.33)	1.31 (1.17-1.44)	1.43 (1.26-1.56)	1.51 (1.33-1.65)
15-min	0.734 (0.668-0.805)	0.870 (0.793-0.954)	1.03 (0.937-1.13)	1.15 (1.04-1.26)	1.30 (1.18-1.42)	1.41 (1.27-1.54)	1.53 (1.37-1.67)	1.64 (1.46-1.79)	1.78 (1.58-1.95)	1.89 (1.66-2.07)
30-min	0.981 (0.892-1.07)	1.17 (1.07-1.29)	1.42 (1.29-1.56)	1.61 (1.46-1.76)	1.86 (1.68-2.03)	2.05 (1.84-2.24)	2.24 (2.00-2.44)	2.43 (2.17-2.66)	2.69 (2.38-2.94)	2.89 (2.54-3.16)
60-min	1.20 (1.09-1.32)	1.45 (1.32-1.59)	1.79 (1.63-1.96)	2.06 (1.87-2.26)	2.42 (2.19-2.65)	2.72 (2.45-2.97)	3.02 (2.70-3.29)	3.33 (2.96-3.63)	3.75 (3.32-4.10)	4.09 (3.60-4.48)
2-hr	1.45 (1.32-1.59)	1.75 (1.60-1.92)	2.19 (1.99-2.40)	2.54 (2.30-2.77)	3.01 (2.72-3.28)	3.39 (3.06-3.70)	3.79 (3.39-4.13)	4.20 (3.74-4.58)	4.77 (4.21-5.20)	5.22 (4.57-5.70)
3-hr	1.56 (1.42-1.71)	1.88 (1.71-2.07)	2.35 (2.13-2.58)	2.73 (2.47-2.99)	3.26 (2.94-3.57)	3.69 (3.31-4.04)	4.15 (3.70-4.53)	4.62 (4.10-5.04)	5.29 (4.64-5.78)	5.83 (5.07-6.38)
6-hr	1.91 (1.74-2.10)	2.30 (2.10-2.54)	2.87 (2.61-3.15)	3.34 (3.02-3.66)	3.99 (3.60-4.37)	4.53 (4.06-4.95)	5.10 (4.55-5.57)	5.71 (5.06-6.22)	6.56 (5.74-7.16)	7.25 (6.30-7.92)
12-hr	2.27 (2.07-2.50)	2.74 (2.50-3.01)	3.40 (3.09-3.73)	3.94 (3.57-4.32)	4.70 (4.24-5.14)	5.32 (4.78-5.81)	5.97 (5.34-6.52)	6.66 (5.92-7.28)	7.63 (6.72-8.34)	8.42 (7.34-9.21)
24-hr	2.72 (2.54-2.92)	3.28 (3.05-3.52)	4.08 (3.80-4.38)	4.73 (4.39-5.08)	5.65 (5.22-6.07)	6.41 (5.89-6.88)	7.20 (6.58-7.74)	8.04 (7.29-8.66)	9.21 (8.26-9.98)	10.2 (9.03-11.0)
2-day	3.25 (3.02-3.50)	3.91 (3.63-4.21)	4.87 (4.52-5.24)	5.66 (5.23-6.09)	6.80 (6.25-7.32)	7.75 (7.09-8.36)	8.76 (7.95-9.47)	9.85 (8.87-10.7)	11.4 (10.1-12.5)	12.7 (11.2-13.9)
3-day	3.47 (3.23-3.73)	4.16 (3.87-4.48)	5.17 (4.81-5.57)	6.01 (5.57-6.47)	7.23 (6.66-7.79)	8.25 (7.57-8.90)	9.34 (8.51-10.1)	10.5 (9.51-11.4)	12.2 (10.9-13.4)	13.6 (12.0-15.0)
4-day	3.68 (3.44-3.97)	4.41 (4.11-4.76)	5.47 (5.10-5.90)	6.36 (5.91-6.86)	7.66 (7.08-8.26)	8.75 (8.05-9.45)	9.93 (9.06-10.7)	11.2 (10.1-12.2)	13.0 (11.7-14.3)	14.6 (12.9-16.0)
7-day	4.29 (3.99-4.63)	5.14 (4.78-5.55)	6.38 (5.92-6.89)	7.42 (6.86-8.02)	8.94 (8.22-9.67)	10.2 (9.35-11.1)	11.6 (10.6-12.6)	13.2 (11.8-14.3)	15.4 (13.6-16.9)	17.2 (15.1-19.0)
10-day	4.84 (4.50-5.25)	5.79 (5.39-6.29)	7.17 (6.66-7.78)	8.32 (7.70-9.02)	10.0 (9.21-10.8)	11.4 (10.4-12.4)	12.9 (11.7-14.1)	14.6 (13.1-15.9)	16.9 (15.0-18.6)	18.9 (16.6-20.9)
20-day	6.66 (6.27-7.11)	7.91 (7.44-8.43)	9.50 (8.92-10.1)	10.8 (10.1-11.5)	12.6 (11.7-13.4)	14.0 (13.0-14.9)	15.4 (14.3-16.5)	16.9 (15.6-18.2)	19.0 (17.3-20.5)	20.6 (18.6-22.4)
30-day	8.21 (7.75-8.70)	9.70 (9.16-10.3)	11.5 (10.8-12.1)	12.9 (12.1-13.6)	14.8 (13.9-15.7)	16.3 (15.3-17.3)	17.9 (16.6-19.0)	19.4 (18.0-20.7)	21.6 (19.8-23.1)	23.2 (21.1-25.0)
45-day	10.3 (9.79-10.9)	12.1 (11.5-12.8)	14.2 (13.4-14.9)	15.8 (14.9-16.6)	17.9 (16.9-18.9)	19.6 (18.4-20.7)	21.2 (19.9-22.4)	22.9 (21.3-24.3)	25.1 (23.2-26.7)	26.7 (24.6-28.6)
60-day	12.3 (11.7-12.9)	14.5 (13.7-15.2)	16.8 (15.9-17.7)	18.5 (17.6-19.5)	20.9 (19.7-22.0)	22.6 (21.3-23.9)	24.3 (22.9-25.7)	26.0 (24.3-27.5)	28.1 (26.2-29.9)	29.7 (27.5-31.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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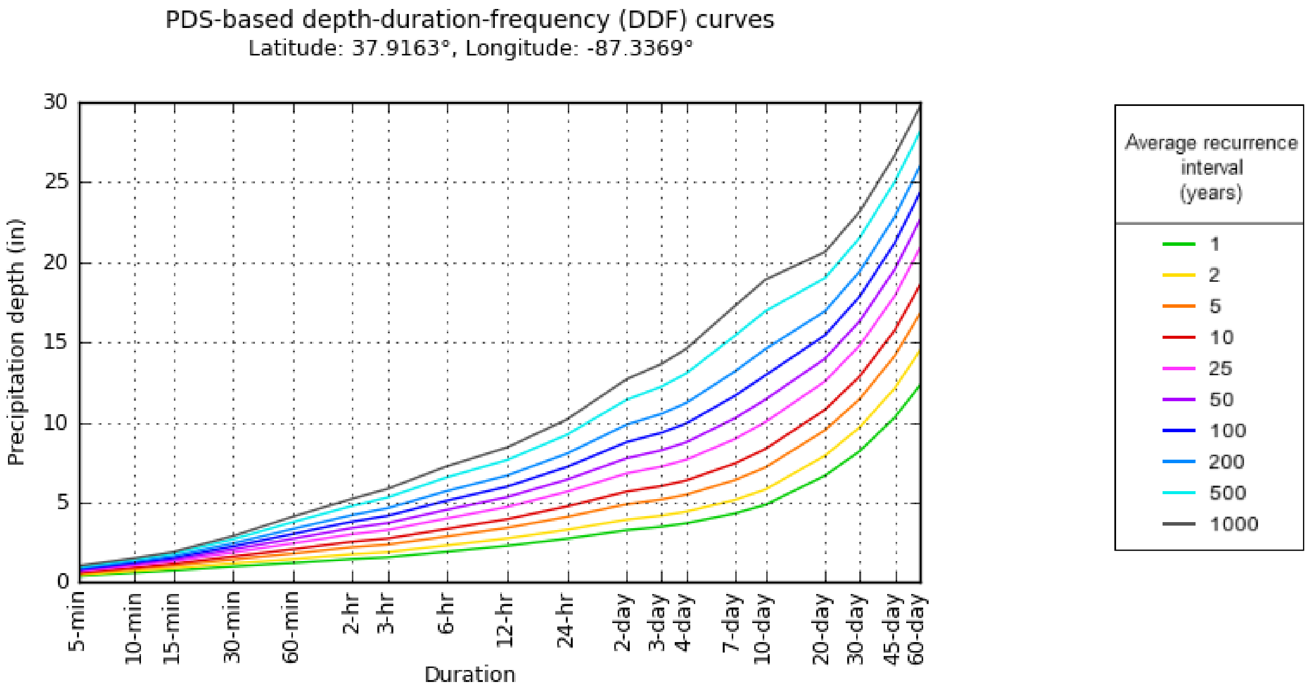
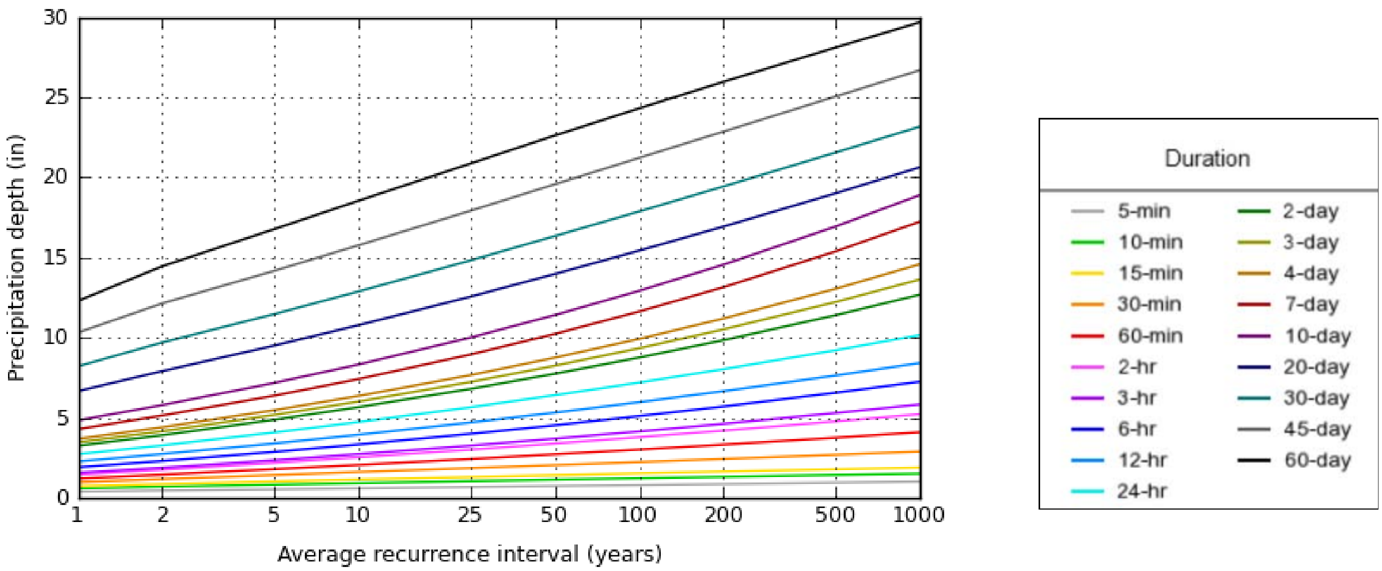
PF graphical





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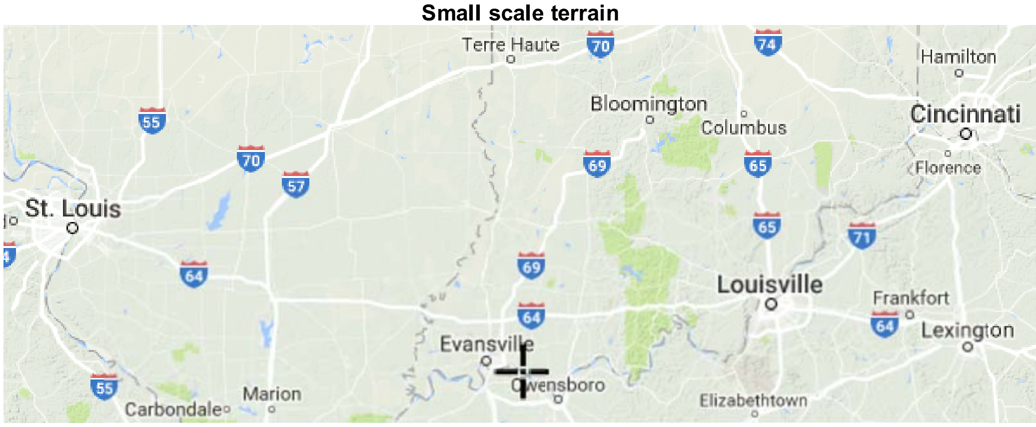
Maps & aerials

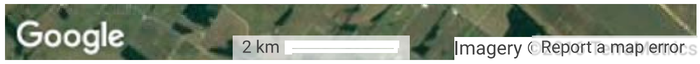
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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Disclaimer

Soils Data

USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Posey County, Indiana

December 10, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:8,330 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 100, 200, 400, 600

Feet: 0, 400, 800, 1600, 2400

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Posey County, Indiana
Survey Area Data: Version 18, Sep 7, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AlB2	Alford silt loam, 2 to 5 percent slopes, eroded	41.2	11.9%
AlB3	Alford silt loam, 2 to 5 percent slopes, severely eroded	28.8	8.3%
AlC3	Alford silt loam, 5 to 10 percent slopes, severely eroded	45.2	13.1%
AlD3	Alford silt loam, 10 to 18 percent slopes, severely eroded	30.1	8.7%
AlE	Alford silt loam, 18 to 35 percent slopes	34.5	10.0%
Du	Dumps, mine	6.6	1.9%
Ev	Evansville silt loam, rarely flooded	7.0	2.0%
Ha	Haymond silt loam, wet substratum, frequently flooded	27.2	7.9%
HeA	Henshaw silt loam, 0 to 2 percent slopes, rarely flooded	4.3	1.3%
Ud	Udorthents, cut and filled	49.4	14.3%
UnA	Uniontown silt loam, 0 to 2 percent slopes, rarely flooded	6.0	1.7%
UnB2	Uniontown silt loam, 2 to 6 percent slopes, eroded, rarely flooded	4.1	1.2%
W	Water	12.1	3.5%
Wa	Wakeland silt loam, 0 to 2 percent slopes, frequently flooded	5.5	1.6%
WeE	Wellston silt loam, 18 to 25 percent slopes	43.7	12.6%
Totals for Area of Interest		**345.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Posey County, Indiana

AlB2—Alford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2x067
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Alford, eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 26 inches: silty clay loam
Bt2 - 26 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Hosmer, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

AlB3—Alford silt loam, 2 to 5 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2x068
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Alford, severely eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Severely Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

Ap - 0 to 4 inches: silt loam
Bt1 - 4 to 44 inches: silty clay loam
Bt2 - 44 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Hosmer, severely eroded
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

AlC3—Alford silt loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 2x06c
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition
Alford, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Severely Eroded

Setting
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile
Ap - 0 to 4 inches: silt loam

Bt1 - 4 to 44 inches: silty clay loam
Bt2 - 44 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Hosmer, severely eroded

Percent of map unit: 6 percent
Landform: Loess hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Alvin

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wakeland, frequently flooded

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

AlD3—Alford silt loam, 10 to 18 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2x06g
Elevation: 330 to 850 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Alford, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford, Severely Eroded

Setting

Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

Ap - 0 to 4 inches: silt loam
Bt1 - 4 to 44 inches: silty clay loam
Bt2 - 44 to 73 inches: silt loam
2BC - 73 to 79 inches: silt loam

Properties and qualities

Slope: 10 to 18 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Wakeland, frequently flooded

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Alvin

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

AlE—Alford silt loam, 18 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2x06h
Elevation: 330 to 820 feet
Mean annual precipitation: 41 to 48 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Alford and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Alford

Setting

Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over gritty loess

Typical profile

A - 0 to 11 inches: silt loam
Bt1 - 11 to 28 inches: silty clay loam
Bt2 - 28 to 76 inches: silt loam

2BC - 76 to 79 inches: silt loam

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Du—Dumps, mine

Map Unit Setting

National map unit symbol: 1tzhx
Elevation: 350 to 1,000 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Dumps: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dumps

Setting

Parent material: Coal extraction mine spoil

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Unranked

Ev—Evansville silt loam, rarely flooded

Map Unit Setting

National map unit symbol: 5cck
Elevation: 360 to 600 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Evansville and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Evansville

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 40 inches: silty clay loam
Cg - 40 to 66 inches: stratified silt loam to silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 20 percent
Available water storage in profile: High (about 11.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Ha—Haymond silt loam, wet substratum, frequently flooded

Map Unit Setting

National map unit symbol: 5ccn
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Haymond and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Haymond

Setting

Landform: Flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty over loamy alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Bw - 10 to 44 inches: silt loam
C - 44 to 60 inches: stratified silt loam to sandy loam to loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 40 to 72 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very high (about 12.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

HeA—Henshaw silt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 5ccp
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Henshaw and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Henshaw

Setting

Landform: Lake terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy lacustrine deposits

Typical profile

Ap - 0 to 7 inches: silt loam
Bt1 - 7 to 28 inches: silty clay loam
Bt2 - 28 to 43 inches: silty clay loam
C - 43 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Evansville

Percent of map unit: 3 percent
Landform: Lake plains
Landform position (two-dimensional): Summit
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Yes

Patton

Percent of map unit: 3 percent
Landform: Depressions on lake plains, depressions on stream terraces
Landform position (two-dimensional): Summit
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Ud—Udorthents, cut and filled

Map Unit Setting

National map unit symbol: 1tzhy
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: Unranked

UnA—Uniontown silt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 5cdp
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Uniontown and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Uniontown

Setting

Landform: Lake terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty lacustrine deposits

Typical profile

Ap - 0 to 11 inches: silt loam
Bt - 11 to 25 inches: silty clay loam
BCt - 25 to 39 inches: silt loam
C - 39 to 60 inches: silt

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

UnB2—Uniontown silt loam, 2 to 6 percent slopes, eroded, rarely flooded

Map Unit Setting

National map unit symbol: 5cdq
Elevation: 340 to 700 feet
Mean annual precipitation: 40 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Uniontown and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Uniontown

Setting

Landform: Lake terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bt - 9 to 25 inches: silty clay loam
BCt - 25 to 39 inches: silt loam
C - 39 to 60 inches: silt

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Wa—Wakeland silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2wyhj
Elevation: 340 to 490 feet
Mean annual precipitation: 38 to 49 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Wakeland, frequently flooded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wakeland, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Cg1 - 8 to 19 inches: silt loam
Cg2 - 19 to 63 inches: silt loam
Cg3 - 63 to 73 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained

Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Birds, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

WeE—Wellston silt loam, 18 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2wyj3
Elevation: 340 to 1,010 feet
Mean annual precipitation: 38 to 49 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 190 to 225 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over residuum weathered from sandstone and siltstone and/or shale

Typical profile

A - 0 to 8 inches: silt loam
Bt - 8 to 35 inches: silt loam
2C - 35 to 51 inches: fine sandy loam
2R - 51 to 61 inches: bedrock

Properties and qualities

Slope: 18 to 25 percent
Depth to restrictive feature: 35 to 72 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Posey County, Indiana			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
AlB2—Alford silt loam, 2 to 5 percent slopes, eroded			
Alford, eroded	95	Low	B
Hosmer, eroded	5	Medium	C/D
AlB3—Alford silt loam, 2 to 5 percent slopes, severely eroded			
Alford, severely eroded	95	Medium	B
Hosmer, severely eroded	5	Medium	D
AlC3—Alford silt loam, 5 to 10 percent slopes, severely eroded			
Alford, severely eroded	90	Medium	B
Hosmer, severely eroded	6	High	D
Alvin	2	—	—
Wakeland, frequently flooded	2	—	—
AlD3—Alford silt loam, 10 to 18 percent slopes, severely eroded			
Alford, severely eroded	90	Medium	B
Wakeland, frequently flooded	6	—	—
Alvin	4	—	—
AlE—Alford silt loam, 18 to 35 percent slopes			
Alford	95	High	B
Wellston	5	—	—

Hydrologic Soil Group and Surface Runoff–Posey County, Indiana			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
Du—Dumps, mine			
Dumps	100	—	—
Ev—Evansville silt loam, rarely flooded			
Evansville	100	Low	B/D
Ha—Haymond silt loam, wet substratum, frequently flooded			
Haymond	100	Very low	B
HeA—Henshaw silt loam, 0 to 2 percent slopes, rarely flooded			
Henshaw	94	Medium	C/D
Evansville	3	Low	B/D
Patton	3	Negligible	C/D
Ud—Udorthents, cut and filled			
Udorthents	100	—	—
UnA—Uniontown silt loam, 0 to 2 percent slopes, rarely flooded			
Uniontown	100	Low	C
UnB2—Uniontown silt loam, 2 to 6 percent slopes, eroded, rarely flooded			
Uniontown	100	Low	C
W—Water			
Water	100	—	—
Wa—Wakeland silt loam, 0 to 2 percent slopes, frequently flooded			
Wakeland, frequently flooded	95	Very low	B/D
Birds, frequently flooded	5	—	—
WeE—Wellston silt loam, 18 to 25 percent slopes			
Wellston	95	High	B
Zanesville	5	High	C

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HydroCAD Output Report

Routing Diagram for Sed Pond_JMM
Prepared by AECOM, Printed 10/5/2021
HydroCAD® 10.00 s/n 01723 © 2013 HydroCAD Software Solutions LLC

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	16.600	5.000	0.000	0.000	21.600	50-75% Grass cover, Fair	9S
0.000	20.000	0.000	0.000	0.000	20.000	<50% Grass cover, Poor	9S
0.000	1.300	0.000	0.000	0.000	1.300	Water Surface	7S
0.000	**37.900**	**5.000**	**0.000**	**0.000**	**42.900**	**TOTAL AREA**	

Summary for Subcatchment 7S: Subcatchment 7

Acre number found using LIDAR data from 2016 and measuring areas in AutoCAD. CN used for Ponded Area was Water Surface.

Time of concentration was input as zero since ponded area has direct runoff to the Pond.

[46] Hint: Tc=0 (Instant runoff peak depends on dt)

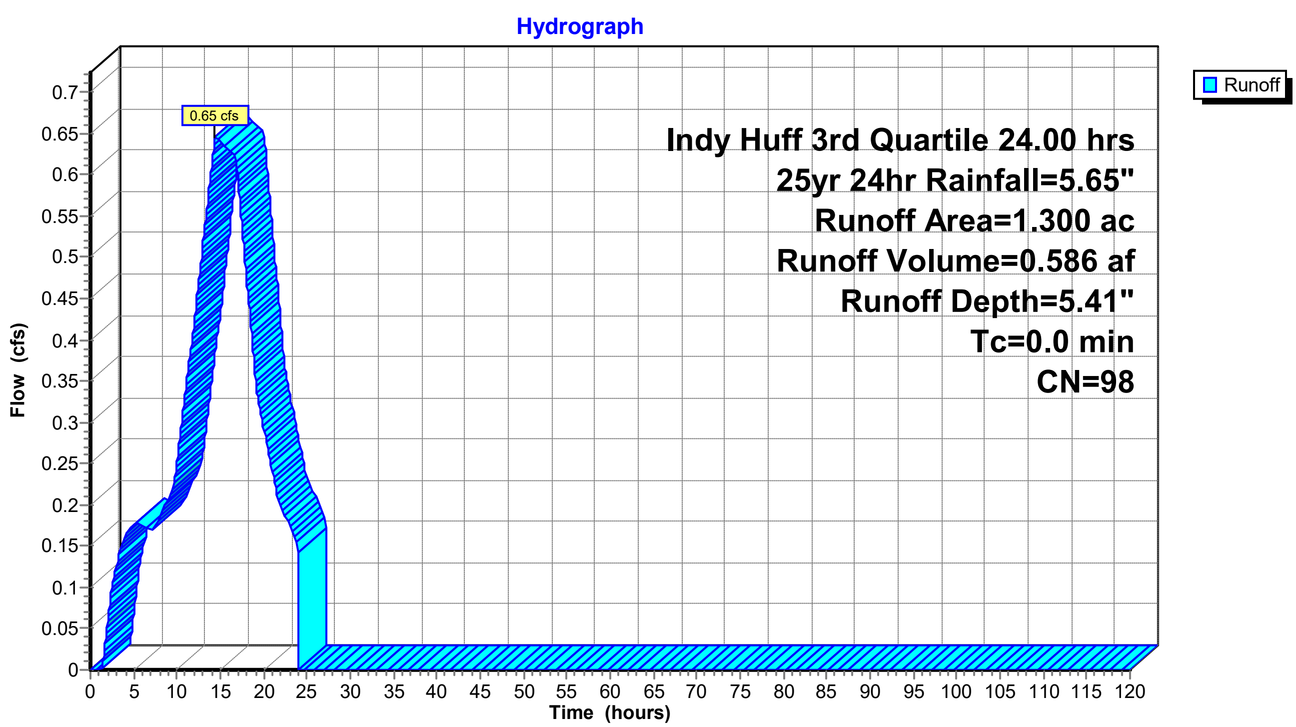
Runoff = 0.65 cfs @ 14.41 hrs, Volume= 0.586 af, Depth= 5.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Indy Huff 3rd Quartile 24.00 hrs 25yr 24hr Rainfall=5.65"

Area (ac)	CN	Description
1.300	98	Water Surface, HSG B
1.300		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.0					**Direct Entry,**

Subcatchment 7S: Subcatchment 7



Summary for Subcatchment 9S: Subcatchment 7

Acre number found using LIDAR data from 2016 and measuring areas in AutoCAD. CN used for the subcatchment is a weighted average based on hydrologic soil data obtained from NRCS.

Time of concentration was calculated by obtaining the distance of the most hydrologically remote point in the subcatchment to the point of collection in the Sedimentation Pond. The distance was calculated in AutoCAD.

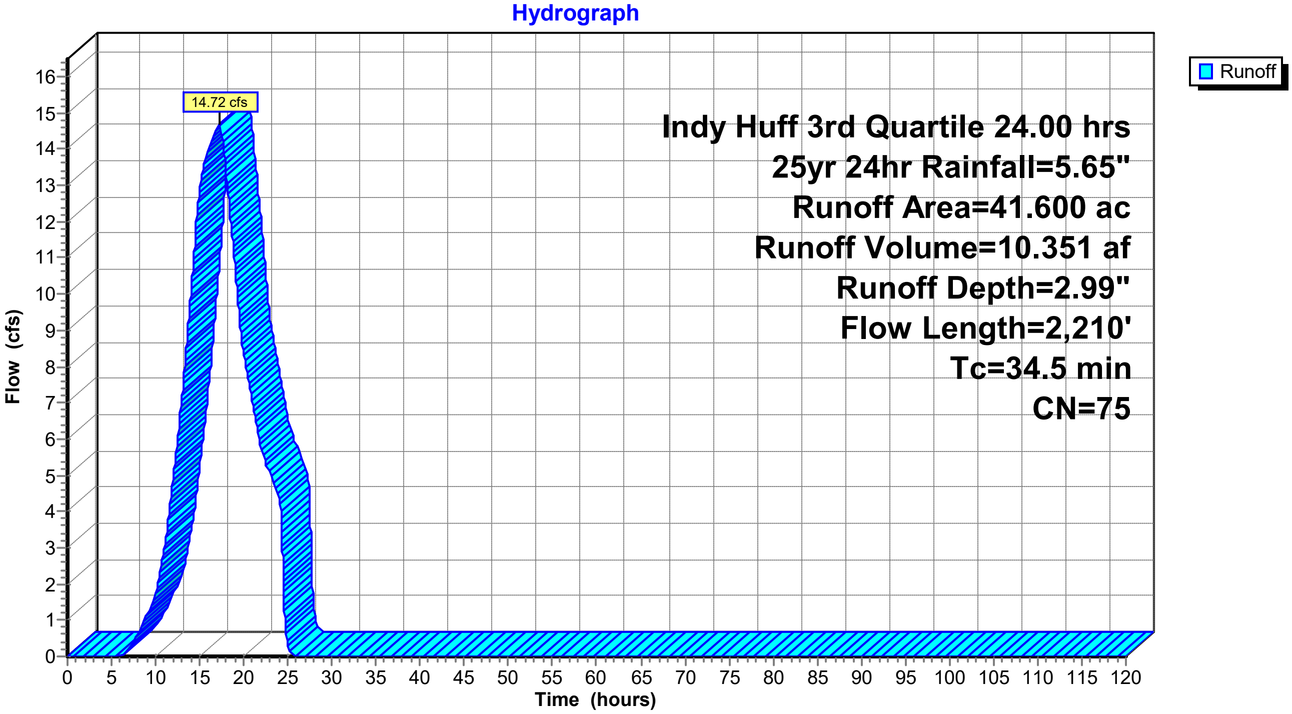
Runoff = 14.72 cfs @ 17.13 hrs, Volume= 10.351 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Indy Huff 3rd Quartile 24.00 hrs 25yr 24hr Rainfall=5.65"

Area (ac)	CN	Description
5.000	79	50-75% Grass cover, Fair, HSG C
20.000	79	<50% Grass cover, Poor, HSG B
16.600	69	50-75% Grass cover, Fair, HSG B
41.600	75	Weighted Average
41.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	300	0.1700	0.50		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.28"
24.6	1,910	0.0167	1.29		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
34.5	2,210	Total			

Subcatchment 9S: Subcatchment 7



Summary for Pond 1P: Sedimentation Pond

The AB Brown Station operates a Type III Restricted Waste Site CCR landfill, and stormwater from the landfill is managed via a perimeter ditch system. One of the reaches of the perimeter ditch system collects and conveys contact flow from the southern end of the landfill in a clockwise direction to the lined Sedimentation Pond. The Sedimentation Pond, constructed in 2015, is approximately 1.3 acres in size, and manages and treats contact stormwater produced from the active cell portions of the landfill.
For the purpose of this analysis the assumption is that the collection manhole can adequately handle all the discharge fromt the sedimentation pond during the 25 year flood event.

Inflow Area = 42.900 ac, 3.03% Impervious, Inflow Depth = 3.06" for 25yr 24hr event
Inflow = 15.30 cfs @ 17.06 hrs, Volume= 10.938 af
Outflow = 13.56 cfs @ 18.09 hrs, Volume= 10.914 af, Atten= 11%, Lag= 61.9 min
Primary = 13.56 cfs @ 18.09 hrs, Volume= 10.914 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Sim-Route method, Time Span= 0.00-120.00 hrs, dt= 0.01 hrs
Starting Elev= 397.50' Surf.Area= 33,000 sf Storage= 107,870 cf
Peak Elev= 401.04' @ 18.09 hrs Surf.Area= 34,969 sf Storage= 228,289 cf (120,419 cf above start)

Plug-Flow detention time= 473.4 min calculated for 8.438 af (77% of inflow)
Center-of-Mass det. time= 273.2 min (1,287.2 - 1,014.0)

Volume	Invert	Avail.Storage	Storage Description
#1	392.00'	352,495 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

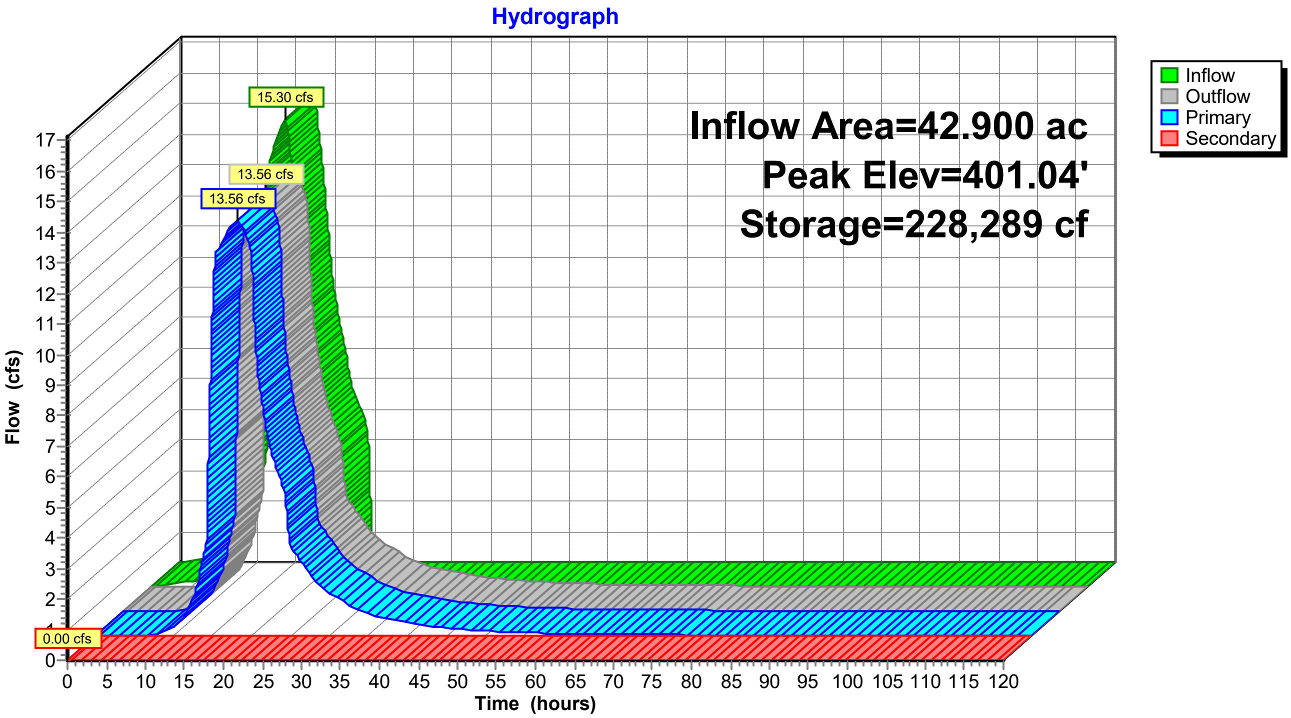
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
392.00	0	0	0
393.00	1	1	1
394.00	22,275	11,138	11,139
397.50	33,000	96,731	107,870
402.00	35,500	154,125	261,995
404.00	50,000	85,500	347,495
404.10	50,000	5,000	352,495

Device	Routing	Invert	Outlet Devices
#1	Device 5	400.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 5	399.00'	**2.0" W x 6.0" H Vert. Orifice/Grate X 2.00** C= 0.600
#3	Device 5	398.20'	**2.0" W x 6.0" H Vert. Orifice/Grate X 2.00** C= 0.600
#4	Device 5	397.50'	**2.0" W x 6.0" H Vert. Orifice/Grate X 2.00** C= 0.600
#5	Primary	397.50'	**18.0" Round CMP_Round 18"** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 397.50' / 396.50' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#6	Secondary	404.00'	**220.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.56 cfs @ 18.09 hrs HW=401.04' (Free Discharge)
└─**5=CMP_Round 18"** (Barrel Controls 13.56 cfs @ 7.67 fps)
  ├─**1=Orifice/Grate** (Passes < 15.45 cfs potential flow)
  ├─**2=Orifice/Grate** (Passes < 1.07 cfs potential flow)
  ├─**3=Orifice/Grate** (Passes < 1.29 cfs potential flow)
  └─**4=Orifice/Grate** (Passes < 1.46 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=397.50' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Sedimentation Pond



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