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INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN
LINCOLN STONE QUARRY
JOLIET 9 STATION
OCTOBER 2024

Pursuant to Illinois Administrative Code (IAC) Part 845.510, Geosyntec Consultants, Inc. (Geosyntec) prepared this Inflow Design Flood Control System Plan for the CCR surface impoundment referred to as the Lincoln Stone Quarry (Quarry) at the Joliet 9 Station (Site) in Joliet, Illinois. The Quarry is leased and operated by Midwest Generation, LLC (Midwest Generation).

Section 845.510(a) of the CCR Rule requires that operators of every existing or new CCR surface impoundment design, construct, operate, and maintain an inflow design flood control system plan that adequately manages flow into the CCR unit during and following the peak discharge of the inflow design flood.

This Inflow Design Flood Control System Plan is being completed in accordance with Sections 845.510(c) and 845.540(b), which require an annual plan certification be completed with the annual inspection. The inflow design flood control system consists of an outflow pipe and maintaining minimum operating freeboard. Justification and documentation of the adequacy of the inflow design flood control systems are presented in the sections below.

The work presented in this report was performed under the direction of Ms. Olivia Covert, of Geosyntec in accordance with Section 845.510(c) and 845.540(b). Mr. Jesse Varsho, P.E. reviewed this plan in accordance with Geosyntec's senior review policy.

1. Quarry Design

The Quarry is located east of the Site's former coal pile and approximately 1,000 feet south of the Des Plaines River. The Quarry is bounded on the north by Patterson Road and on the east by Brandon Road. The Quarry is considered incised in accordance with 35 IAC Section 845.120 (Geosyntec, 2021) and is bounded on the north, south, and east boundaries by cut slopes. The western portion of the Quarry, referred to as the West Filled Area, has been backfilled to existing adjacent grades and capped. Prior to the conversion of the Joliet 9 Station to natural gas in spring 2016, the Quarry received sluiced CCR from Joliet Units 6, 7, and 8, through a piping system that discharged into the southwest corner (Units 7 and 8) and the northwest corner (Unit 6) of the Quarry. The Quarry stopped receiving CCR in 2019; therefore, rainfall and storm water runoff from the farmland and wooded area to the south are the only sources of discharge to the Quarry. Discharge of water from the Quarry is controlled through two pipes that gravity drain to a quarry located north of Patterson Road which is then discharged to the Des Plaines River in accordance with the Station's NPDES permit. The invert elevation of these pipes is approximately 527 feet Mean Sea Level (ft MSL), above the ash accumulation level in that area of the Quarry. Gate valves on the outlet pipes are controlled manually by Midwest Generation staff to comply with the Quarry's Bureau of Land Permit No. 1994-241-LFM requirement that local groundwater gradients flow from east to west and from south to north. Discharge from the Quarry is handled in accordance with the surface water requirements in Section 845.110(b)(3) and 35 IAC Subtitle C.

2. Inflow Design Flood Control System Plan Documentation

Table 1 below provides a summary of applicable documentation demonstrating how the system has been designed and constructed to meet the requirements of Section 845.510.

Table 1: Additional Documentation

Documentation	Assessment
Identification of the design storm event for the catchment area and CCR unit	Identification of the design storm event is provided in Section 3. A drawing of the Quarry and catchment area is presented in **Figure 1**.
Characterization of the rainfall abstractions, including but not limited to depression storage and infiltration in the upstream catchment area and selection of the appropriate run-off model	The selected run-off model, calculations, and upstream catchment area assumptions are provided in **Appendix A**.
Identification and characterization of and intake or decant structures	Outflow pipes are described in Section 1. Because there is sufficient freeboard in the Quarry to prevent overflow during the design event, as described in Section 6, capacity of outflow pipes is not evaluated.
Appropriate characterization and capacity of spillways	The Quarry does include a spillway.
Characterization of downstream hydraulic structures	Because there is sufficient freeboard in the Quarry to prevent overflow during the design event, as described in Section 6, characterization of downstream structures is not required.

3. Design Event

As the Quarry is considered incised in accordance with 35 IAC Section 845.120 (Geosyntec, 2021), the inflow design flood is the 25-year flood in accordance with Section 845.510(a)(3). Flood flows are typically established by performing statistical analysis on historical stream gauge records. In instances where measured stream flow records are not available, deterministic methods such as a design storm method (ASCE, 1996) is used to establish flood flows. In the design storm method, a rainfall to runoff analysis (e.g., Runoff Curve Number Method) is used to establish the stormwater runoff flows. The underlying assumptions in the design storm method are: 1) rainfall will occur uniformly across the entire contributing watershed; and 2) a specified return period storm event produces the same return period flood flow (e.g., 25-year storm event produces the 25-year flood). Since there are no measured stream flow records at the Quarry, the design storm method was used to estimate the inflows to the Quarry for the 24-hour, 25-year precipitation event.

4. Existing Quarry Water Level

Water accumulates inside the Quarry due to its incised characteristics, and water levels within the Quarry are controlled to meet the Quarry's permitting requirements (see Section 1). Midwest Generation monitors the surface water level within the Quarry daily and controls outflow from the Quarry to influence the localized groundwater gradients. Average daily water level data within the Quarry is shown in **Figure 2** and indicates that the surface water level has been maintained below 548 ft MSL over the last five years. The operating level of the Quarry is assumed to be 548 ft MSL or below. Based on the site topography[1], the water level within the Quarry could rise to approximately 572 ft MSL before discharging from the Quarry.

5. Catchment Area

A description of the area surrounding the Quarry is shown in the following table.

Direction	Land Use
North	Patterson Road, two small quarries, woodland, Des Plaines River.
West	Woodland, heavy industrial site.
South	Grass and farmland, woodland, heavy industrial site.
East	South Brandon Road, low density residential area, inactive quarry, grass and farmland, large active quarry (Southeast)

The catchment area of the Quarry was delineated using topographic maps and images. The catchment area is approximately 89 acres, see **Figure 1**.

6. Analysis of Inflow Design Flow and Storage Capacity

The inflow design flow for the 25-year event was calculated based on runoff associated with the

[1] Topography is dated April 2021, generated by Will County, Illinois Server.

24-hour, 25-year storm event for the upstream catchment area, which was estimated based on regional topography and the Runoff Curve Number Method. Analysis demonstrating the inflow design flow is included in **Appendix A**. The total inflow into the Quarry during the 24-hour 25-year storm event is estimated to be 38.4 acre-feet. Based on 2024 surface water conditions, the surface area of the impounded water within the Quarry is approximately 12.5 acres. The estimated potential water level increase is calculated to be 3.1 ft from the design event. Therefore, the water level in the Quarry after the design event is estimated to be at or below 552 ft MSL (operating level of 548 ft MSL plus 4 ft).

The freeboard after the design event is estimated to be a minimum of 20 ft (572 ft MSL – 552 ft MSL). As the existing freeboard is estimated to be at least 20 feet, sufficient storage capacity exists within Quarry to manage the inflow from the design flood event. The inflow design system, as designed and constructed, meets the requirements of Section 845.510.

7. Limitations and Certification

The annual inflow design flood control system plan meets the requirements of 35 IAC Sections 845.510 and 845.540 and was prepared in accordance with current practices and the standard of care exercised by scientists and engineers performing similar tasks in the field of civil engineering. The contents of this report are based solely on the observations of the conditions observed by Geosyntec personnel and information provided to Geosyntec by Midwest Generation. Consistent with applicable professional standards of care, our opinions and recommendations were based in part on data furnished by others, which was consistent with other information that we developed in the course of our performance of the scope of services. The information contained in this report is intended for use solely by Midwest Generation and their subconsultants.

Jesse P. Varsho, P.E.
Illinois Professional Engineer No. 062.059069
License Expires: November 30, 2025

8. References

ASCE, 1996. American Society of Civil Engineers Task Committee on Hydrology Handbook. Hydrology Handbook. ASCE Publications.

Geosyntec Consultants, 2021, Lincoln Stone Quarry Site Visit, CCR Rule Compliance Demonstrations, Midwest Generation LLC Power Stations, Illinois, dated 31 August.

Attachments

Figure 1: Catchment Area
Figure 2: Quarry Water Level
Appendix A: Stormwater Run-on Calculations

Figures

Legend

Catchment Area

1 ft. Elevation Contours

Notes

- Aerial imagery from ESRI (2024).
- Topography contours provided by Will County Data Viewer (March 2021).

1,000 500 0 1,000 Feet

Catchment Area
Lincoln Stone Quarry
Joliet 9 Station

Joliet, Illinois

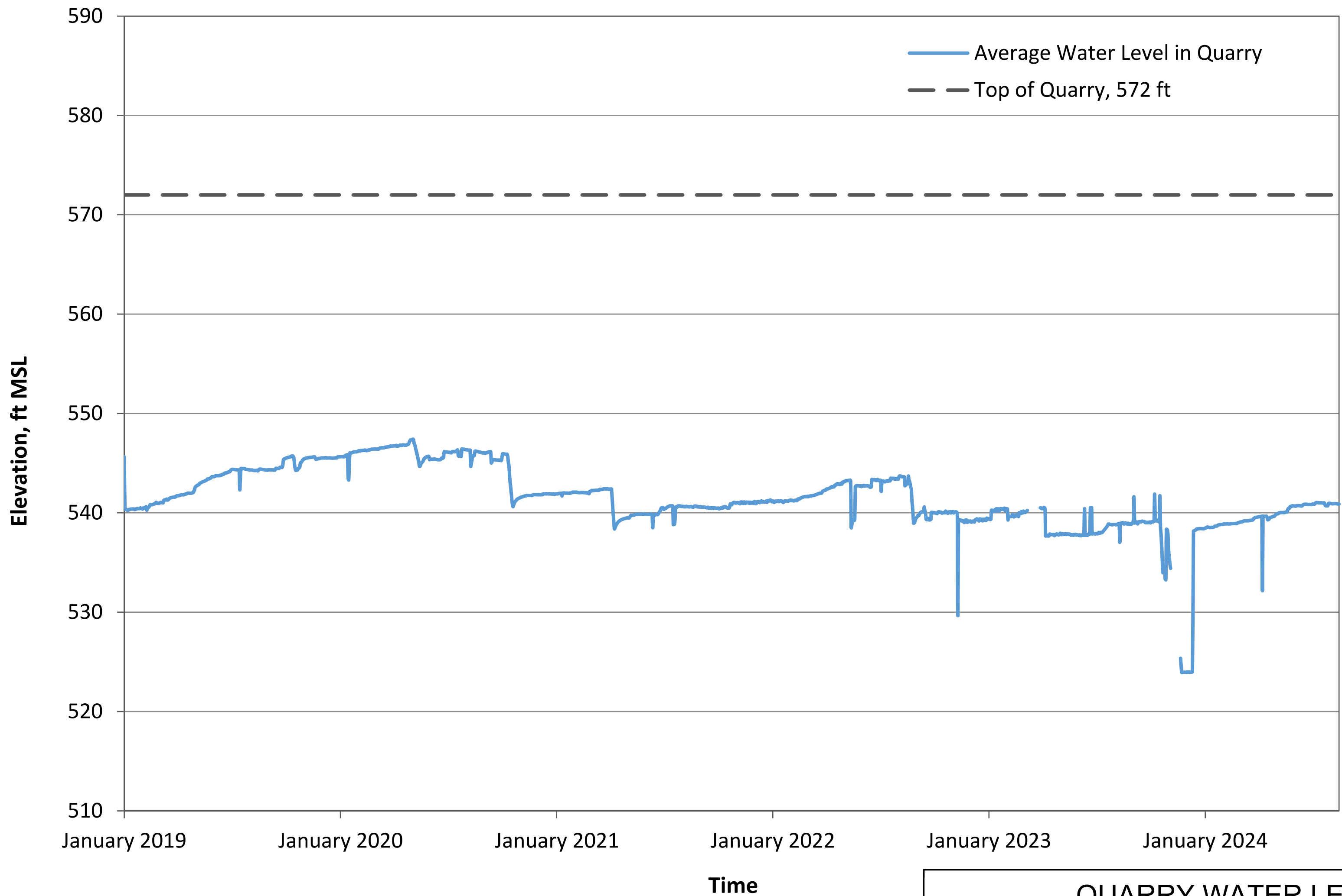
Geosyntec consultants

Figure **1**

Project No: GLW8043

August 2024

Z:\DWG\N\NRG\LSQ\IDFCP\2022 Plan\MXDs\20240815_Lincoln Stone Quarry.mxd. ASoltero. 8/15/2024. Project/Phase/Task.



QUARRY WATER LEVEL
LINCOLN STONE QUARRY
JOLIET 9 STATION
JOLIET, ILLINOIS

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Figure 2

PROJECT NO: GLW8069 | OCTOBER 2024

Note: Daily Quarry water levels recorded by KPRG Associates.

Appendix A

Stormwater Run-on Calculations

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COMPUTATION COVER SHEET REVISION 3

Client: **Midwest Generation**	Project: **Joliet 9 Station**	Project/ Proposal No.: Task No.	**GLW8069**

Title of Computations: **STORMWATER RUN-ON CALCULATIONS, LINCOLN STONE QUARRY**

Computations by:	Signature	[signature]	20 September 2021
	Printed Name	Olivia Covert	Date
	Title	Professional	
Assumptions and Procedures Checked by: (peer reviewer)	Signature	[signature]	27 September 2021
	Printed Name	Regan Welch	Date
	Title	Project Engineer	
Computations Checked by:	Signature	[signature]	27 September 2021
	Printed Name	Regan Welch	Date
	Title	Project Engineer	
Computations backchecked by: (originator)	Signature	[signature]	27 September 2021
	Printed Name	Olivia Covert	Date
	Title	Professional	
Approved by: (pm or designate)	Signature	[signature]	29 September 2021
	Printed Name	Jesse Varsho, P.E.	Date
	Title	Principal Engineer	

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval
1	All	09/28/22	ORC	REW	10/3/22
2	All	09/13/23	ORC	JPV	09/13/23
3	All	08/26/24	BA	ORC	09/03/24

Written by:	OC	Date:	20 / 09 / 21	Reviewed by:	RW	Date:	27 / 09 / 21
			DD MM YY				DD MM YY
Client:	Midwest Generation	Project:	Joliet 9	Project/Prop No.:	GLW8069	Task No.:	1

STORMWATER RUN-ON CALCULATIONS
LINCOLN STONE QUARRY
JOLIET 9 STATION

INTRODUCTION

Pursuant to 35 Illinois Administration Code (IAC) Section 845.510(c), Geosyntec Consultants, Inc. (Geosyntec) prepared this calculation package to support development of the Inflow Design Flood Control System Plan for the Lincoln Stone Quarry (Quarry) at the Joliet 9 Station (Site) in Joliet, Illinois. 35 IAC Section 845.510(c) requires that operators of every existing or new CCR (Coal Combustion Residuals) surface impoundment design, construct, operate, and maintain an inflow design flood control system that adequately manages flow into the CCR unit during and following the peak discharge of the inflow design flood. This calculation evaluates the inflow design flood and evaluates the capacity of the Quarry to handle inflow from this event.

CALCULATION OF INFLOW DESIGN FLOW

The City of Joliet's "Consolidated Stormwater Management, Soil Erosion and Sediment Control and Floodplain Management Regulations specifies that the Soil Conservation Service (SCS) Runoff Curve Number Method be used to calculate design runoff volumes. The SCS method and its current application are documented in Technical Release 55 (TR-55) published by Natural Resources Conservation Service (NRCS). The SCS runoff equation is:

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S}$$

Where:

Q = runoff (in)

P = rainfall (in)

S = potential maximum retention after runoff begins (in) and

I_a = initial abstraction (in)

The initial abstraction (I_a) accounts for all losses prior to the beginning of runoff including water retained in surface depressions, intercepted by vegetation, evaporation, and infiltration. I_a is typically correlated with soil cover parameters and is approximated by the equation:

$$I_a = 0.2S$$

S is a function of the soil type and cover and is related to the runoff curve number (CN) by the equation:

$$S = \frac{1000}{CN} - 10$$

Where:

CN = Runoff Curve Number

CN is determined by the Hydrologic Soils Group (HSG) and cover type, treatment, hydrologic condition, and antecedent moisture condition. In cases where multiple land uses occur in the same drainage area, a composite CN is determined by the area weighted method.

After calculating runoff (Q) for a design storm event, the total volume of runoff is then calculated by multiplying the runoff by the drainage area (A).

DRAINAGE AREA (A)

The area of the drainage basin of the Quarry was delineated using topographic maps[1] and aerial images[2]. The catchment area has an estimated area of 89.2 acres (refer to Figure 1), and was subdivided into four areas based on land use (cover) and soil type (HSG) for determination of CN. The catchment area outside of the Quarry footprint is located to the south.

RUNOFF CURVE NUMBER (CN)

The value of the runoff curve number (CN) has been extensively studied in the literature. Its value depends on the land use and type of soil (HSG). In general, the value of CN is

[1] Topography is dated April 2021, generated by Will County, Illinois Server.
[2] ESRI ArcGIS online images accessed in August 2024. Imagery credit: ESRI

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higher for developed, impervious surfaces, and Type D soils. Correspondingly, CN has lower values for undeveloped pervious surfaces, and Type A soils.

Land use in the drainage basin within the Quarry is mostly rock or standing water. Land use in the drainage basin outside of the Quarry is mostly pasture, grass and farmland. Industrial sites to the south and east of the Quarry are located outside the drainage basin.

HSG for use in CN selection was determined by importing the watershed boundary into the Natural Resources Conservation Service Web Soil Survey (Attachment A). Approximately 0.5% of the site consists of vegetated Type B soils, 45.2% of the site consists of vegetated Type C soils, 11.4% vegetated Type D soils, 42.9% water. Based on the HSG and land use analysis a composite CN of 88.5 was determined for the drainage area. The following table summarized the analysis of the runoff curve number.

Description	Area (acres)	HSG	Cover Type	CN	Weighted
Pond	38.3	W	Water	100	42.9
Vegetated	0.4	B	Open Space-Fair	69	0.3
Vegetated	40.3	C	Open Space-Fair	79	35.7
Vegetated	10.2	D	Open Space-Fair	84	9.6
Total	89.2 acres		Composite		88.5

RAINFALL DEPTH (P)

In accordance with 35 IAC Section 845.510(a)(3)(C), the inflow design flood for an incised CCR surface impoundment, such as the Quarry, is the 25-year flood.

The City of Joliet requires the use of the Illinois State Water Survey Bulletin 70, Northeast Sectional rainfall statistics. Will County requires the use of the Illinois State Water Survey Updated Bulletin 70, Northeast Sectional Code (Angel and Marcus, 2019) in runoff volume calculations. The 1989 Bulletin 70 has a 25-year, 24-hour rainfall depth of 6.04 inches, and the Updated Bulletin 70 has a higher 25-year, 24-hour rainfall depth (6.45 inches). Per the City of Joliet and Will County requirements, Updated Bulletin 70 publication value was used in the calculations for the Quarry.

It should be noted that the Illinois State Water Survey Bulletin 75 (Angel and Marcus, 2020) is the most recent publication of the precipitation frequency study for Illinois. Bulletin 75 has the same 25-year, 24-hour rainfall depth as the Updated Bulletin 70.

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Client:	Midwest Generation	Project:	Joliet 9	Project/Prop No.:	GLW8069	Task No.:	1

INFLOW DESIGN FLOW

The following table summarizes the inflow design flow calculations.

Parameter	25-Year, 24-Hour Precipitation Event
CN	88.5
S	1.3
P	6.5
I_a	0.3
Q (in)	5.2
Area (Ac)	89.2
Volume (ac-ft)	38.4

The potential increase in Quarry water surface elevation was estimated by dividing the total inflow (38.4 acre-ft for the design event) by the Quarry wet area (estimated to be 12.5 acres based on 2024 aerial images). The increase in water depth in the Quarry for the design event is approximately 3.1 ft.

WATER LEVEL AND FREEBOARD

Water accumulates inside the Quarry due to its incised characteristics, and water levels within the Quarry are controlled to meet the Quarry's Bureau of Land Permit No. 1994-241-LFM requirement that local groundwater gradients flow from east to west and from south to north. Midwest Generation monitors the surface water level within the Quarry daily and implements engineering controls to influence the localized groundwater gradients. Average daily water level data within the Quarry indicates that the surface water level has been maintained below 548 feet mean seal level (ft MSL) over the last five years (Figure 2). The water surface elevation for the design event, assuming the water level is at 548 ft prior to the start of the design event, is 552 ft.

Based on the site topography[3], the water level within the Quarry could rise to approximately 572 ft MSL before discharging. The freeboard after the design event is estimated to be at least 20 ft (572 ft MSL – 552 ft MSL). As the existing freeboard is

[3] Topography is dated April 2021, generated by Will County, Illinois Server.

estimated to be 20 feet (minimum), sufficient storage capacity exists within Quarry to manage the design flood event without discharge.

1. REFERENCES

City of Joliet, 2003, Consolidated Storm Water Management, Soil Erosion and Sediment Control and Floodplain Management Regulations.

Angel, James, and Markus, Momcilo, March 2019. Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70 (Updated Bulletin 70, Illinois State Water Survey).

Angel, James, and Markus, Momcilo, March 2020. Frequency Distributions of Heavy Precipitation in Illinois: Bulletin 75 (Bulletin 75, Illinois State Water Survey).

Technical Release 55 (TR-55), Natural Resources Conservation Service, USDA, 2016, Soil Map, Will County, Illinois, Web Soil Survey, National Cooperative Soil Survey. USDA Natural Resources Conservation Service.

Water Resource Ordinance for Unincorporated Will County.

ATTACHMENTS

Attachment A: Soil Map from USDA – Natural Resources Conservation Service

Attachment B: Illinois State Water Survey Updated Bulletin 70

Attachment A

Soil Map from USDA – Natural Resources Conservation Service

Soil Map—Will County, Illinois
(Hydrologic Soil Group - Will County)

88° 6' 43" W   88° 5' 48" W

407200 407300 407400 407500 407600 407700 407800 407900 408000 408100 408200 408300 408400

41° 29' 47" N   41° 29' 47" N

4594400 4594300 4594200 4594100 4594000 4593900 4593800 4593700

41° 29' 21" N   41° 29' 21" N

407200 407300 407400 407500 407600 407700 407800 407900 408000 408100 408200 408300 408400

88° 6' 43" W   88° 5' 48" W

Map Scale: 1:5,760 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

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 1:12,000.

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: Will County, Illinois
Survey Area Data: Version 18, Aug 28, 2023

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

Date(s) aerial images were photographed: Jul 4, 2020—Jul 6, 2020

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
23B	Blount silt loam, Lake Michigan Lobe, 2 to 4 percent slopes	9.4	10.5%
228C2	Nappanee silty clay loam, 4 to 6 percent slopes, eroded	0.8	0.9%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	6.0	6.7%
369A	Waupecan silt loam, 0 to 2 percent slopes	0.4	0.5%
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	1.7	1.9%
530D2	Ozaukee silt loam, 6 to 12 percent slopes, eroded	0.6	0.6%
531B	Markham silt loam, 2 to 4 percent slopes	4.9	5.5%
531C2	Markham silt loam, 4 to 6 percent slopes, eroded	2.2	2.5%
802B	Orthents, loamy, 1 to 6 percent slopes	12.6	14.2%
802D	Orthents, loamy, rolling	12.3	13.8%
W	Water	38.3	42.9%
Totals for Area of Interest		**89.1**	**100.0%**

Description

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Attachment B

Illinois State Water Survey Updated Bulletin 70

I S W S C O N T R A C T R E P O R T 2019-05

Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70

James Angel and Momcilo Markus

March 2019

ILLINOIS
Illinois State Water Survey
PRAIRIE RESEARCH INSTITUTE

Results

Frequency Estimates

To determine the precipitation frequency, the previously described regional frequency analysis was applied to the AMS data. The results were then converted to the PDS domain based on the relationship defined in Eq. 1 and adjusted for the trend (Eq. 3). These results, however, still had occasional minor inconsistencies caused by several factors, such as variable data length for different durations, which resulted in irregular frequency curves. To produce the final curves, these irregularities had to be smoothed out, which was done based on the authors' professional judgment and knowledge of specific regions and gages.

The results for all sections are shown in the following tables. Table 4 displays the key for the codes used in Table 5, where the results are presented numerically. The results are shown graphically in Figures 8–12.

Table 4 Storm and Sectional Codes for Table 5

Storm Code		*Sectional Code*	
1	240 hours	1	Northwest
2	120 hours	2	Northeast
3	72 hours	3	West
4	48 hours	4	Central
5	24 hours	5	East
6	18 hours	6	West Southwest
7	12 hours	7	East Southeast
8	6 hours	8	Southwest
9	3 hours	9	Southeast
10	2 hours	10	South
11	1 hour		

Table 5 (continued)

Storm code	Section code	Rainfall (inches) for given recurrence interval 2-year	5-year	10-year	25-year	50-year	100-year	500-year
4	1	3.61	4.59	5.43	6.72	7.73	8.83	11.53
4	2	3.66	4.71	5.62	6.99	8.13	9.28	12.10
4	3	3.76	4.76	5.62	6.81	7.72	8.60	10.58
4	4	3.59	4.61	5.47	6.65	7.55	8.40	10.21
4	5	3.54	4.49	5.32	6.48	7.38	8.27	10.26
4	6	3.66	4.61	5.38	6.48	7.33	8.11	9.93
4	7	3.92	4.85	5.61	6.67	7.46	8.21	9.76
4	8	4.28	5.29	6.10	7.25	8.15	9.08	11.40
4	9	4.64	5.54	6.27	7.24	7.94	8.58	10.06
4	10	4.06	5.02	5.86	7.04	8.01	9.02	11.56
5	1	3.34	4.22	5.03	6.20	7.20	8.25	10.84
5	2	3.34	4.30	5.15	6.45	7.50	8.57	11.24
5	3	3.48	4.45	5.24	6.38	7.25	8.06	9.91
5	4	3.32	4.30	5.10	6.20	7.05	7.85	9.53
5	5	3.12	3.97	4.71	5.78	6.62	7.43	9.32
5	6	3.23	4.07	4.76	5.79	6.56	7.31	9.04
5	7	3.49	4.33	5.00	5.98	6.71	7.40	8.84
5	8	3.69	4.56	5.27	6.30	7.14	7.96	10.06
5	9	4.07	4.89	5.55	6.42	7.06	7.68	8.99
5	10	3.63	4.52	5.28	6.38	7.29	8.23	10.57
6	1	3.14	3.97	4.73	5.83	6.77	7.75	10.19
6	2	3.14	4.04	4.84	6.06	7.05	8.06	10.57
6	3	3.27	4.18	4.93	6.00	6.82	7.58	9.32
6	4	3.12	4.04	4.79	5.83	6.63	7.38	8.96
6	5	2.93	3.73	4.43	5.43	6.22	6.98	8.76
6	6	3.04	3.83	4.47	5.44	6.17	6.87	8.50
6	7	3.28	4.07	4.70	5.62	6.31	6.96	8.31
6	8	3.47	4.29	4.95	5.92	6.71	7.48	9.45
6	9	3.83	4.60	5.22	6.03	6.64	7.22	8.45
6	10	3.41	4.25	4.96	6.00	6.85	7.73	9.93

Table 6 Precipitation Frequency Estimates (in inches) with 90% Confidence Intervals (continued)

Storm Code	Section Code	Recurrence interval						
		2-year	5-year	10-year	25-year	50-year	100-year	500-year
5	1	**3.34** (3.00 - 3.69)	**4.22** (3.79 - 4.68)	**5.03** (4.50 - 5.61)	**6.20** (5.51 - 6.99)	**7.20** (6.34 - 8.21)	**8.25** (7.20 - 9.54)	**10.84** (9.16 - 13.00)
5	2	**3.34** (3.00 - 3.69)	**4.30** (3.85 - 4.77)	**5.15** (4.60 - 5.73)	**6.45** (5.71 - 7.26)	**7.50** (6.59 - 8.55)	**8.57** (7.46 - 9.93)	**11.24** (9.48 - 13.63)
5	3	**3.48** (3.19 - 3.79)	**4.45** (4.07 - 4.86)	**5.24** (4.79 - 5.74)	**6.38** (5.81 - 7.05)	**7.25** (6.56 - 8.09)	**8.06** (7.23 - 9.07)	**9.91** (8.61 - 11.47)
5	4	**3.32** (3.01 - 3.65)	**4.30** (3.89 - 4.74)	**5.10** (4.61 - 5.64)	**6.20** (5.58 - 6.91)	**7.05** (6.31 - 7.93)	**7.85** (6.99 - 8.92)	**9.53** (8.31 - 11.16)
5	5	**3.12** (2.86 - 3.38)	**3.97** (3.64 - 4.31)	**4.71** (4.30 - 5.15)	**5.78** (5.25 - 6.38)	**6.62** (5.97 - 7.39)	**7.43** (6.63 - 8.41)	**9.32** (8.08 - 10.96)
5	6	**3.23** (2.95 - 3.54)	**4.07** (3.71 - 4.47)	**4.76** (4.32 - 5.26)	**5.79** (5.21 - 6.45)	**6.56** (5.85 - 7.37)	**7.31** (6.45 - 8.30)	**9.04** (7.73 - 10.59)
5	7	**3.49** (3.18 - 3.80)	**4.33** (3.93 - 4.74)	**5.00** (4.53 - 5.50)	**5.98** (5.39 - 6.64)	**6.71** (6.00 - 7.54)	**7.40** (6.54 - 8.42)	**8.84** (7.58 - 10.44)
5	8	**3.69** (3.36 - 4.04)	**4.56** (4.15 - 5.01)	**5.27** (4.78 - 5.82)	**6.3** (5.67 - 7.03)	**7.14** (6.37 - 8.03)	**7.96** (7.03 - 9.05)	**10.06** (8.60 - 11.78)
5	9	**4.07** (3.71 - 4.44)	**4.89** (4.45 - 5.35)	**5.55** (5.03 - 6.10)	**6.42** (5.79 - 7.12)	**7.06** (6.32 - 7.91)	**7.68** (6.80 - 8.70)	**8.99** (7.73 - 10.51)
5	10	**3.63** (3.29 - 4.00)	**4.52** (4.08 - 5.01)	**5.28** (4.73 - 5.88)	**6.38** (5.66 - 7.21)	**7.29** (6.36 - 8.36)	**8.23** (7.07 - 9.59)	**10.57** (8.67 - 13.03)