

# PRELIMINARY DRAINAGE REPORT

for

## Eleanor's Place *WILLOW CROSSING* Vanderburgh County, Indiana

Project No.: 11822.4.001-B

March 24, 2023

**APPROVED**

APR 11 2023

VANDERBURGH COUNTY  
DRAINAGE BOARD

**Prepared For:**

New Residential Development, LLC  
304 E State Road 68  
Haubstadt, IN 47639

**Prepared By:**

Morley  
4800 Rosebud Ln.  
Newburgh, IN 47630  
Office: 812.464.9585  
Fax: 812.464.2514



*James E. Morley*  
3/24/23

Received by the  
Vanderburgh County  
Surveyor's Office

MAR 24 2023

Time 4:03 PM Initials AR



# MORLEY

ARCHITECTS | ENGINEERS | SURVEYORS

- ▶ 812.464.9585 office 812.464.2514 Fax
- ▶ 4800 Rosebud Ln., Newburgh, IN 47630
- ▶ morleycorp.com

MAR 24 2023

Time 4:03PM Initials AR

APPLICANT INFORMATION FORM 801

Project Name: Eleanor's Place  
Approximate Location: 13800 N Green River Road  
Evansville, IN 47725  
Applicant Name: New Residential Development LLC  
Applicant is (check one)  Individual (s)  
 Partnership or legal LLC  
 Corporation  
Applicant Address: 304 E. State Road 68  
City: Haubstadt  
State: IN  
Zip Code: 47639  
Email: phil@reinbrechthomes.com

For Individual (s)

I (we) do hereby certify that the Information contained on this application is to true and correct. I (we) further understand that upon completion of the project that an as built drawing or certification statement as required by the Vanderburgh County Code will be submitted as required and that failure to provide such certification could result in fines under Section 13.04.110 and/or make me (us) ineligible for future drainage plan approvals until such time as an as built drawing or certification is submitted.

Signature \_\_\_\_\_

Date

Signature \_\_\_\_\_

Date

For Partnership (s)

I (we) do hereby certify that the Information contained on this application is to true and correct. I (we) further understand that upon completion of the project that an as built drawing or certification statement as required by the Vanderburgh County Code will be submitted as required and that failure to provide such certification could result in fines under Section 13.04.110 and/or make me (us) ineligible for future drainage plan approvals until such time as an as built drawing or certification is submitted.

Signature of Senior or Managing Partner

*Phil Reinbrecht*

Printed Name

Phil Reinbrecht

Date

3/24/23

If partnership does not have a Senior or Managing Partner than signatures of all partners

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

For Corporation

I do hereby certify that the Information contained on this application is to true and correct. I further understand that upon completion of the project that an as built drawing or certification statement as required by the Vanderburgh County Code will be submitted as required and that failure to provide such certification could result in fines under Section 13.04.110 and/or make the corporation ineligible for future drainage plan approvals until such time as an as built drawing or certification is submitted.

Signature \_\_\_\_\_

Date \_\_\_\_\_

Printed Name \_\_\_\_\_

Title \_\_\_\_\_ (note if not a vice president or above of applicant company, than attached a Delegation of Authority)

## Introduction

Eleanor's Place is a proposed single-family detached residential subdivision. The site is located at the extension of Persimmon Lane south of Magnolia Ridge Section 1. The site is within Section 11, Township 5 South, Range 10 West located in Scott Township, Vanderburgh County. Please refer to the location map provided within this report for further details.

## Existing Conditions

### Site Conditions

The 41.79-acre (original tract) site was originally included in Magnolia Ridge primary plat approval from 2018, prepared by Cash Waggner & Associates PC for The Oakridge Group LLC. The project was designed and received final drainage approval in October 2018.

The original tract includes Parcels 2 & 3 from Magnolia Parcelization (PAR-2018-016).

A Primary Plat for Eleanor's Place was previously approved at the March 3, 2022 APC meeting showing 132 lots.

The current conditions of the 41.79-acre tract is cultivated row crop fields with rolling terrain and mild slopes. Water and sewer are available to the site.

### Soils Information

The Soil Survey of Vanderburgh County indicates the soils to be Hosmer silt loam (HoA) with 0 to 2 percent slopes, Hosmer silt loam (HoB2) with 2 to 5 percent slopes, Hosmer silt loam (HoC3) with 5 to 10 percent slopes, severely eroded, and Stendal silt loam (St). Please refer to the attached soils map.

### Floodplain Information

The property lies within Zone X. The site was scaled on the Flood Insurance Rate Map (FIRM) for Vanderburgh County, Indiana, Community Panel Number 18163C0130D, dated March 17, 2011. Please refer to the enclosed excerpt from this map.

## Proposed Development

The proposed project contains 160 residential lots. Lots are generally 0.16 acres or larger. This development includes typical elements of a single-family detached subdivision: houses, driveways, streets, landscaping, and a storm sewer system. The expected total impervious surface included within the development is approximately 734,100 SF, or 40% of the total project site.

### The proposed design of the drainage control system

The storm system is designed to closely replicate the existing drainage patterns while capturing a large portion of the runoff created from the site, and discharging only a minimal amount of runoff undetained. Only a small portion along the north and south edges of the subdivision are expected to leave the site undetained to the north and south, respectively. Generally, these areas follow these drainage patterns in the existing condition.



The storm system is comprised of swales, inlets and storm sewer that work together to direct runoff to the proposed basins throughout the project. In general, runoff from an individual lot will be directed either to the gutter of the streets and enter the storm sewer through curb inlets, or to a backyard swale that will either enter the storm sewer through a flared end section, or will discharge directly into the proposed basin.

The proposed project will consist of 4 separate basins, all onsite. The 4 separate basins will function independently, with each basin reducing the amount of post-developed runoff leaving the site to the allowable release rate, as determined by the associated pre-developed subbasins.

### **Assumptions or Special Conditions**

In the analysis of the drainage control system, any assumptions made are for the purpose of being conservative. As with most single-family developments, certain assumptions must be made. The following assumptions were used during the analysis:

- Each lot has 3,250 SF of impervious area, typically split evenly between what drains to the front yard and what drains to the back yard.
  - 2,250 SF of which is assumed to be rooftop
  - 500 SF is assumed in both the front and rear yards for things such as driveways, decks, patios, etc.

### **Results of the Analysis**

Analysis of the pre-developed site delineated 4 subbasins, as shown on the pre-developed subbasin exhibit. For the pre-developed site, the runoff coefficient for cultivated (2%-5%) and cultivated (5%-10%) were used. The Time of Concentration calculations and  $Q_{10}$  values are shown for each of the pre-developed subbasins. Detailed calculations are included as an attachment.

#### **Pre-Developed Subbasin 1:**

- Area = 19.97 acres
- C = 0.425
- $T_c$  = 21.93 mins
- $Q_{10}$  = 30.15 CFS

#### **Pre-Developed Subbasin 2:**

- Area = 4.22 acres
- C = 0.35
- $T_c$  = 19.92 mins
- $Q_{10}$  = 5.59 CFS

**Pre-Developed Subbasin 3:**

- Area = 12.93 acres
- C = 0.35
- $T_c$  = 22.80 mins
- $Q_{10}$  = 15.65 CFS

**Pre-Developed Subbasin 4:**

- Area = 4.15 acres
- C = 0.35
- $T_c$  = 22.72 mins
- $Q_{10}$  = 5.03 CFS

Once the project is fully developed, 55 new sub-basins will be created resulting in a total drainage area of approximately 41.65 acres. The weighted runoff coefficient, C, for each of the post-developed subbasins can be seen on the attached worksheets. Calculations generally took into account lawn areas, swales, rooftop, pavement, and water surface area.

**Developed Sub-basin Summary:**

- Sub-basins 2, 3, 5, 6 and 8-27 will be collected and detained in the North basin.
  - Off-Site Subbasins OS-B and OS-C will be accounted for in the North basin via pass through calculations.
- Sub-basins 28-30 and 43-44 will be collected and detained in the Northeast basin.
  - Off-Site Subbasins OS-E and OS-F will be accounted for in the Northeast basin via pass through calculations.
- Sub-basins 31-42 and 48-52 will be collected and detained in the South basin
- Sub-basins 45-47, 53 and 55 will be collected and detained in the Southeast basin.
  - Off-Site Subbasin OS-D will be accounted for in the Southeast basin via pass through calculations
- Sub-basins 1, 4 and 7 will sheet flow undetained to the north to the existing ditch.
- Sub-basin 54 will sheet flow undetained to the south to the existing ditch.

The following analysis is provided using the Technical Memorandum for undetained drainage areas.

#### Subbasin 1

- Area = 0.76 acres
- C = 0.57

#### Subbasin 4

- Area = 0.57 acres
- C = 0.56

#### Subbasin 7

- Area = 0.33 acres
- C = 0.55

#### Subbasin 54

- Area = 0.78
- C = 0.47

#### Criteria #1

- $0.76 \text{ Ac.} + 0.57 \text{ Ac.} + 0.33 \text{ Ac.} + 0.78 \text{ Ac.} = 2.44 \text{ Ac.} < 41.79 \text{ Ac.} * 0.1 = 4.179 \text{ Ac.}$

#### Criteria # 2

- Pre-Developed Subbasin 1
  - $0.76 \text{ Ac.} + 0.57 \text{ Ac.} + 0.33 \text{ Ac.} = 1.66 \text{ Ac.} < 19.97 \text{ Ac.}$
- Pre-Developed Subbasin 4
  - $0.78 \text{ Ac.} < 4.15 \text{ Ac.}$

#### Criteria #3

- Pre-Developed Subbasin 1
  - $A * c_u = 8.49$
  - $A * c_d = 0.93$
  - Therefore,  $A * c_d < A * c_u$
- Pre-Developed Subbasin 4
  - $A * c_u = 1.45$
  - $A * c_d = 0.37$
  - Therefore,  $A * c_d < A * c_u$



Details for each of the proposed basins are provided below. All basins are proposed as wet retention basins.

**North Basin Details:**

- Pool Elevation = 402.50
- 25-Yr Storage Elevation = 404.75
- Emergency Overflow = 405.25
  - Depth of Flow through spillway = 9"
- 24" Discharge
- $Q_{25}$  Release = 18.24 CFS

**Northeast Basin Details:**

- Pool Elevation = 412.00
- 25-Yr Storage Elevation = 413.50
- Emergency Overflow = 414.00
  - Depth of Flow through spillway = 6"
- 12" Discharge
- $Q_{25}$  Release = 3.33 CFS

**South Basin Details:**

- Pool Elevation = 410.50
- 25-Yr Storage Elevation = 412.75
- Emergency Overflow = 413.25
  - Depth of Flow through spillway = 9"
- 18" Discharge
- $Q_{25}$  Release = 8.36 CFS

**Southeast Basin Details:**

- Pool Elevation = 412.75
- 25-Yr Storage Elevation = 414.50
- Emergency Overflow = 415.00
  - Depth of Flow through spillway = 6"
- 12" Discharge w/ 7" orifice
- $Q_{25}$  Release = 1.58 CFS



**A detailed description, depiction, and log of all hydrologic and hydraulic calculations or modeling, and the results obtained thereby; together with the input and output files for all computer runs**

All calculations, logs, exhibits, and modeling are enclosed within this report.

**Maps showing individual drainage areas within the project subdivided for use in the analysis thereof**

All calculations, logs, exhibits, and modeling are enclosed within this report.

**Summary**

The proposed development is a redesign of the previously approved Eleanor's Place primary plat. Further analysis can be found in the Final Drainage Plans and Report dated 4-26-22 and approved at the Drainage Board meeting on 4-26-22. This report has provided analysis and proposed conditions which ultimately lessen the overall drainage impact of the project site and its downstream adjoiners.

Total Pre-Developed Release  $Q_{10}$  = 56.42 CFS

Onsite Basins Developed Release  $Q_{25}$  = 34.34 CFS

Undetained Sub-Basins #1, 4, 7, and 54 Developed Release  $Q_{25}$  = 9.11 CFS

Total Developed Release  $Q_{25}$  = 43.45 CFS

Overall, the developed project will release less stormwater runoff during the 25-year storm than it's pre-developed area during the 10-year storm.

**13.04.160 Contents of preliminary drainage plan.**

A. The contents of the preliminary drainage plan shall include a map based on the most current county planimetric maps, or a topographic map prepared from a more recent aerial photo reconnaissance that provides more accurate data, complete with contour lines, and showing the following:

[Preliminary Drainage Plan submitted on 3/24/2023](#)

1. The extent and area of each watershed affecting the design of the drainage facilities for the project;

[See attached watershed exhibits.](#)

2. The soil types based on the most current information available from the SWCD;

[See attached Soils Map.](#)

3. Zone "A" floodplain based on the current FIRM panels;

[See attached FIRM Map.](#)

4. The existing man-made and natural waterways, ponds, basins, pipes, culverts, and other drainage facilities or features within or affecting the project;

[See Preliminary Drainage Plan and attached aerial map.](#)

5. The preliminary layout and design of the streets, and all stormwater drainage facilities, including depressed pavements used to convey or temporarily store overflow from the heavier storms, and all outlets for the storm water drainage facilities

[See Preliminary Drainage Plan.](#)

6. The existing streams, floodways, and floodplains to be maintained, and new channels to be constructed, their locations, cross sections, profiles, and materials used;

[See Preliminary Drainage Plan.](#)

7. The proposed culverts and bridges to be built, with the proposed materials to be used;

[See Preliminary Drainage Plan.](#)

X

8. Existing detention basins or ponds within the project, or outside the project but affecting it, to be maintained, enlarged, or otherwise altered, together with any new basins or ponds to be built; and their basis of design;

See Preliminary Drainage Plan and Form 800.

X

9. The estimated depth and amount of storage required of the basins and ponds, and their available freeboards;

See Preliminary Drainage Plan and Form 800.

X

10. The estimated location and percentage of impervious surface existing and expected to be constructed at completion of the project;

The estimated total impervious surface expected to be constructed, including all streets and developed lots, is approximately 734,100 SF, or 40% of the total project site.

X

11. Any interim plan which is to be incorporated into the project pending its completion according to the final Drainage Plan.

Not applicable.

X

12. A copy of the Notice of Public Hearing as required by the Area Plan Commission and under Section 13.04.140 H of the Vanderburgh County Drainage Code with a copy of the returned receipts from all certified mailings or proof of Certificate of Mailing.

See attached copy of Notice to be sent 7 days before the Drainage Board Meeting.

X

B. Notations and Explanations on the Preliminary Plan. All notations necessary to indicate the existing conditions, and the proposed functions of the various features shown thereon; and shall include the following.

See Preliminary Drainage Plan.

X

C. Geographic Orientation Required. A north arrow, scale, location insert, and other information necessary for geographic clarification shall be included on a preliminary plan.

See Preliminary Drainage Plan.

X

D. Data Required to Accompany Preliminary Plan. Descriptive data sufficient to support the feasibility of the preliminary drainage plan with regard to the requirements of this chapter, including calculations of the predevelopment and post development runoff rates using rainfall data supplied herein shall accompany a preliminary drainage plan.

Analysis of runoff conditions from a 10-year undeveloped and 25-year developed storm event were analyzed using the Rational Method. The Ration Method is appropriate for estimating peak discharges for small drainage areas of up to 50 acres.

Runoff coefficients used were those found from the Vanderburgh County Technical Memorandum #1 provided in the Vanderburgh County Drainage Ordinance. These show on the attached subbasin drainage calculations.

The Form 800 was used to size the on-site basins in accordance with the Vanderburgh County Drainage Ordinance. The Form is attached to this report.

The analysis of the undeveloped site shows 56.42 CFS of storm water runoff during a 10 year storm event. Once developed, the composite "C" value will have an almost negligible increase. However, per code, the developed site must accommodate the 25-year storm even. The total discharge of the on-site basins and the undetained areas sums to be 43.45 CFS. The attached report has further information and calculations.

**\*\*\* Notice of Public Hearing \*\*\***

DATE: March 24, 2023

DOCKET NO.: \_\_\_\_\_

APPLICANT: New Residential Development LLC  
304 E State Road 68, Haubstadt, IN 47639

OWNER OF RECORD: New Residential Development LLC  
304 E State Road 68, Haubstadt, IN 47639

ENGINEER: Morley  
4800 Rosebud Lane, Newburgh, IN 47630

Dear adjoiner:

Notice is hereby given that a Preliminary Drainage Plan for Eleanor's Place with a location of 170 feet south of the intersection formed by Persimmon Lane and Spanish Moss Boulevard has been submitted to the Vanderburgh County Surveyor's Office, Room 325, Civic Center, Evansville, IN. The submitted Preliminary Drainage Plan will be heard for approval or disapproval before the Drainage Board meeting on April 11, 2023 in Room 301 of the Civic Center Complex. A copy of the Preliminary Drainage Plan is available for review in the County Surveyor's Office during normal business hours. The Drainage Board meeting starts immediately following the Commissioner's meeting at 3:00 PM. If you have any questions and would like to speak with the Engineer directly, please call 812-464-9585.

Sincerely,

\_\_\_\_\_  
James E. Morley, P.E., P.S.



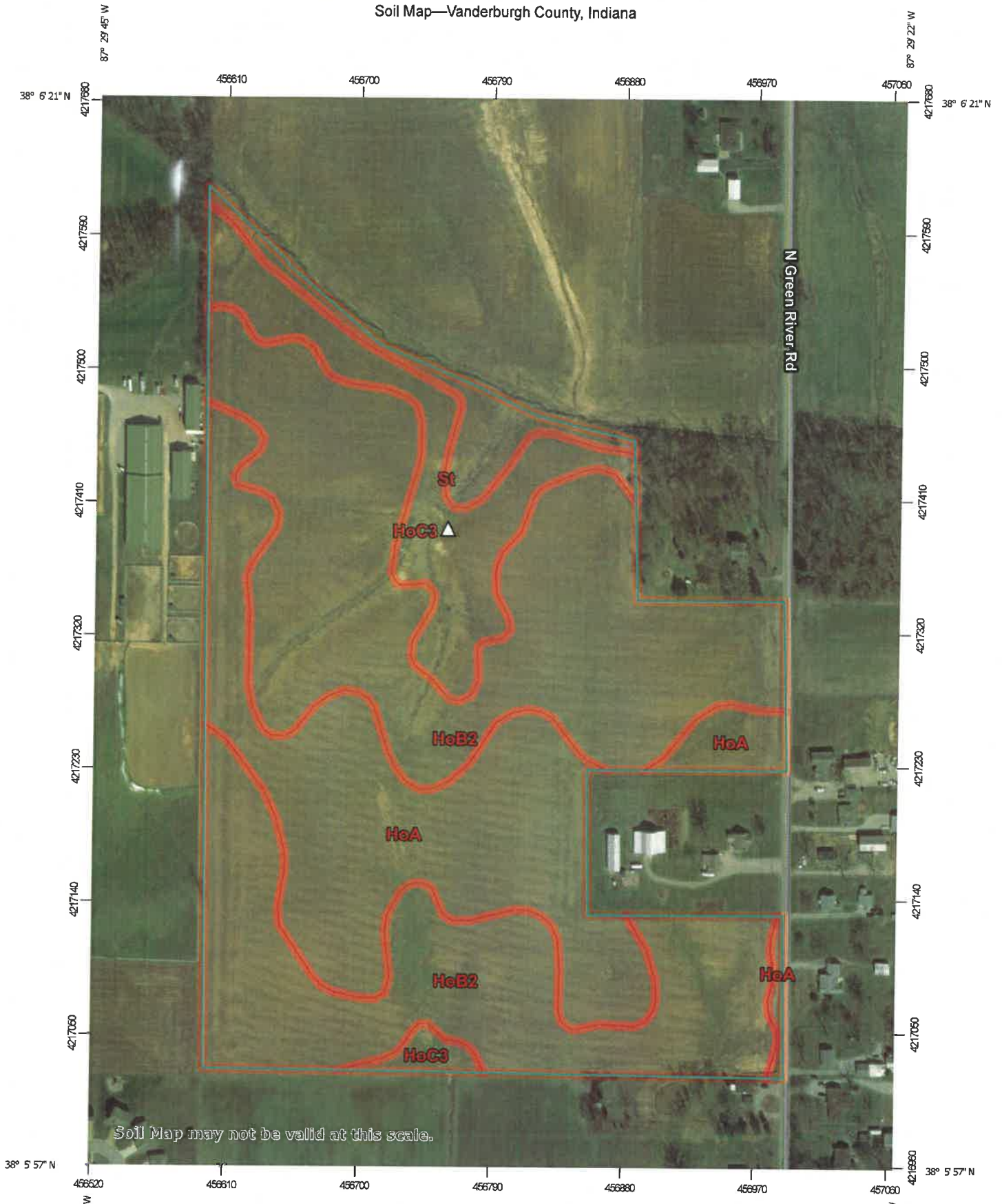
Aerial Map



Project Site  
(41.79 Acres)



Soil Map—Vanderburgh County, Indiana



Soil Map may not be valid at this scale.








































Map Scale: 1:3,520 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge ticks: 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: Vanderburgh County, Indiana  
 Survey Area Data: Version 21, Sep 9, 2021

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

Date(s) aerial images were photographed: Feb 12, 2016—Mar 9, 2017

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
HoA	Hosmer silt loam, 0 to 2 percent slopes	11.1	27.5%
HoB2	Hosmer silt loam, 2 to 5 percent slopes, eroded	23.1	57.3%
HoC3	Hosmer silt loam, 5 to 10 percent slopes, severely eroded	4.7	11.8%
St	Stendal silt loam	1.4	3.5%
<b>Totals for Area of Interest</b>		<b>40.4</b>	<b>100.0%</b>

# National Flood Hazard Layer FIRMette

87°29'54"W 38°6'22"N



## Legend

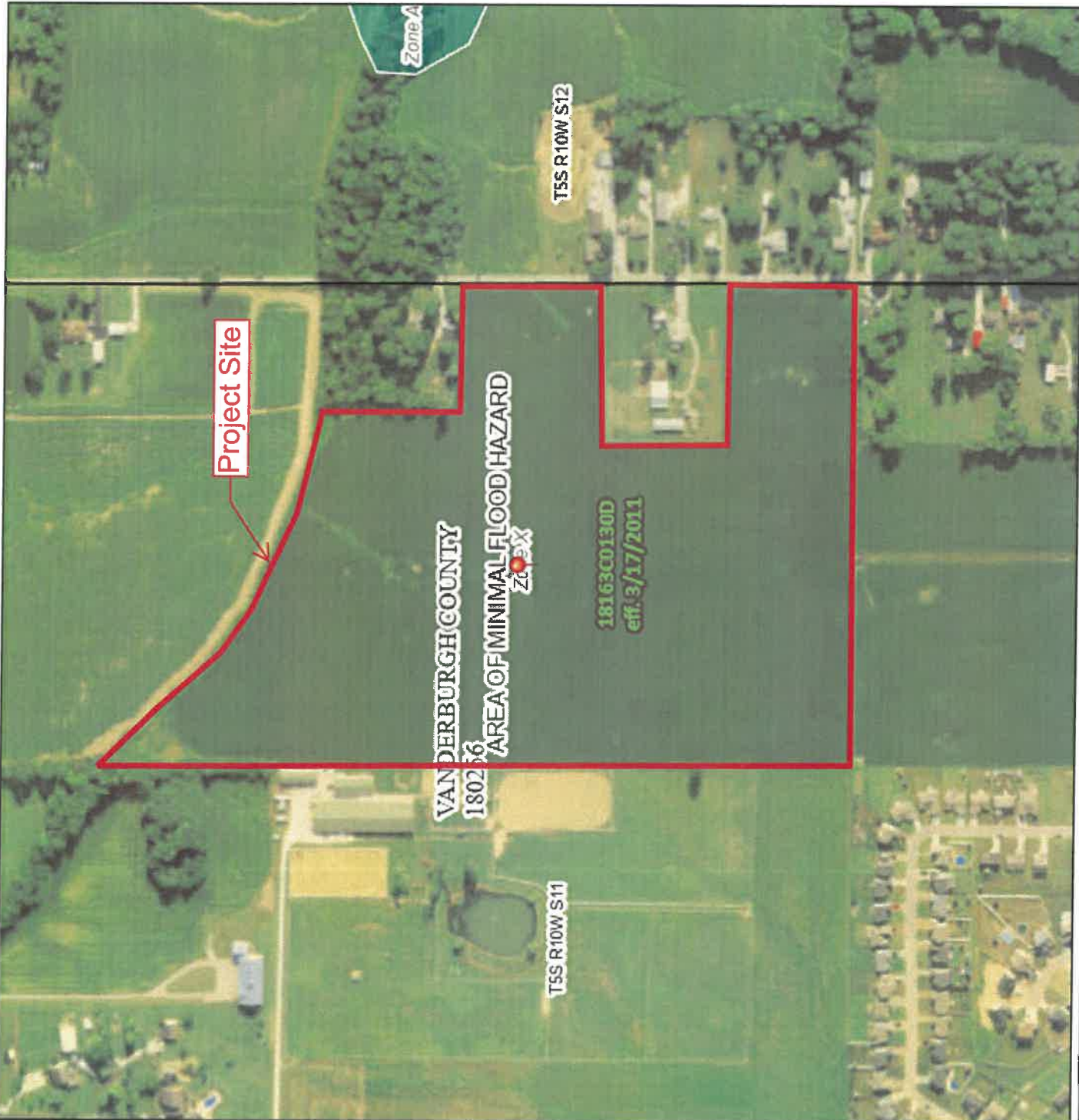
SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

<b>SPECIAL FLOOD HAZARD AREAS</b>	Without Base Flood Elevation (BFE) <i>Zone A, V, AE9</i>
	With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
	Regulatory Floodway
<b>OTHER AREAS OF FLOOD HAZARD</b>	0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
	Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
	Area with Reduced Flood Risk due to Levee. See Notes, <i>Zone X</i>
	Area with Flood Risk due to Levee <i>Zone D</i>
<b>OTHER AREAS</b>	Area of Minimal Flood Hazard <i>Zone X</i>
	Effective LOMRS
	Area of Undetermined Flood Hazard <i>Zone</i>
<b>GENERAL STRUCTURES</b>	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
<b>OTHER FEATURES</b>	Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
<b>MAP PANELS</b>	Digital Data Available
	No Digital Data Available
	Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **11/12/2021 at 12:27 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

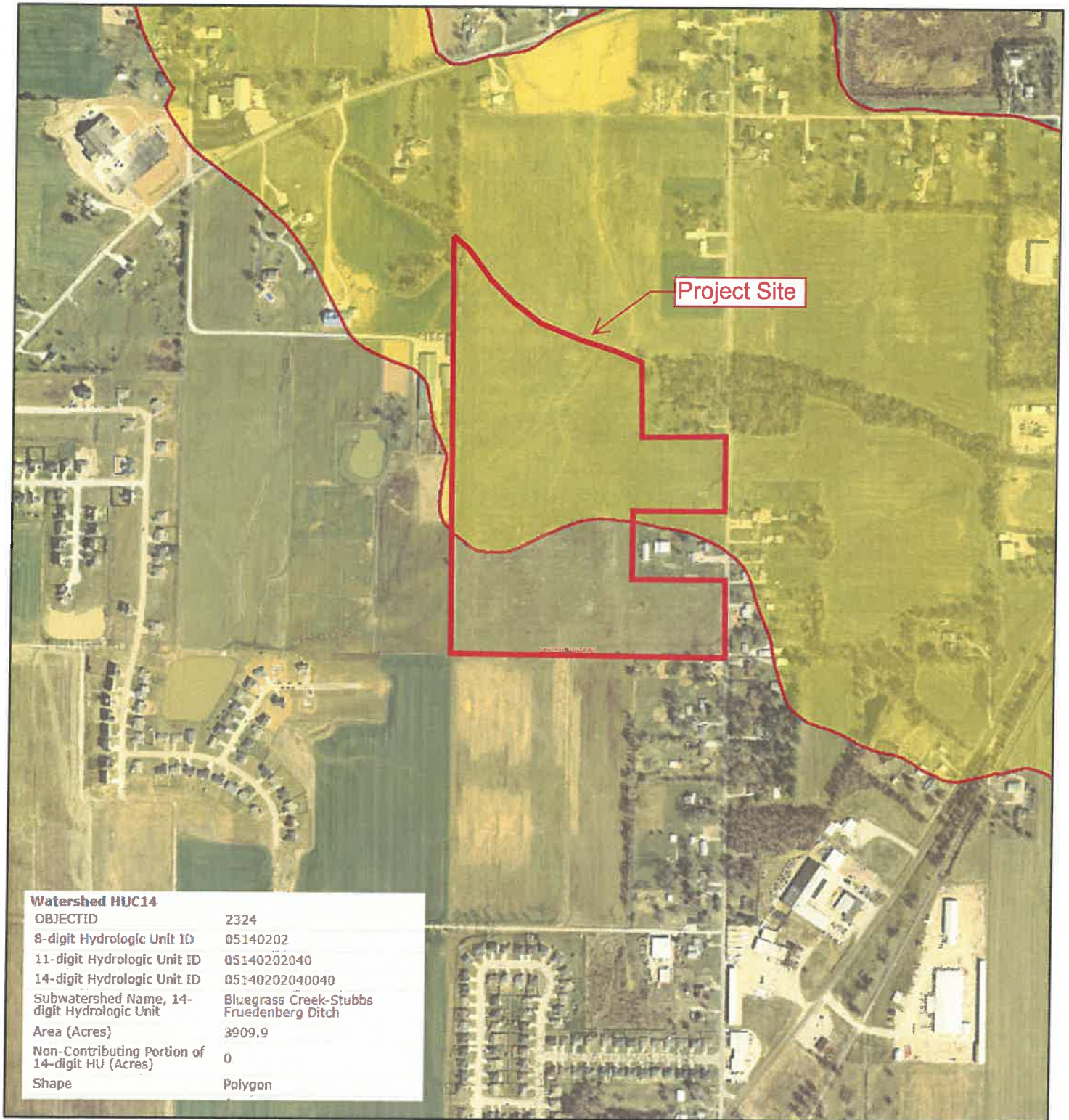
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRMette panel number, and FIRMette effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



87°29'17"W 38°5'54"N





# HUC 14 Map

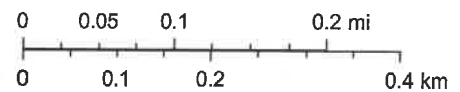


Watershed HUC14	
OBJECTID	2324
8-digit Hydrologic Unit ID	05140202
11-digit Hydrologic Unit ID	05140202040
14-digit Hydrologic Unit ID	05140202040040
Subwatershed Name, 14-digit Hydrologic Unit	Bluegrass Creek-Stubbs Fruedenberg Ditch
Area (Acres)	3909.9
Non-Contributing Portion of 14-digit HU (Acres)	0
Shape	Polygon

November 12, 2021

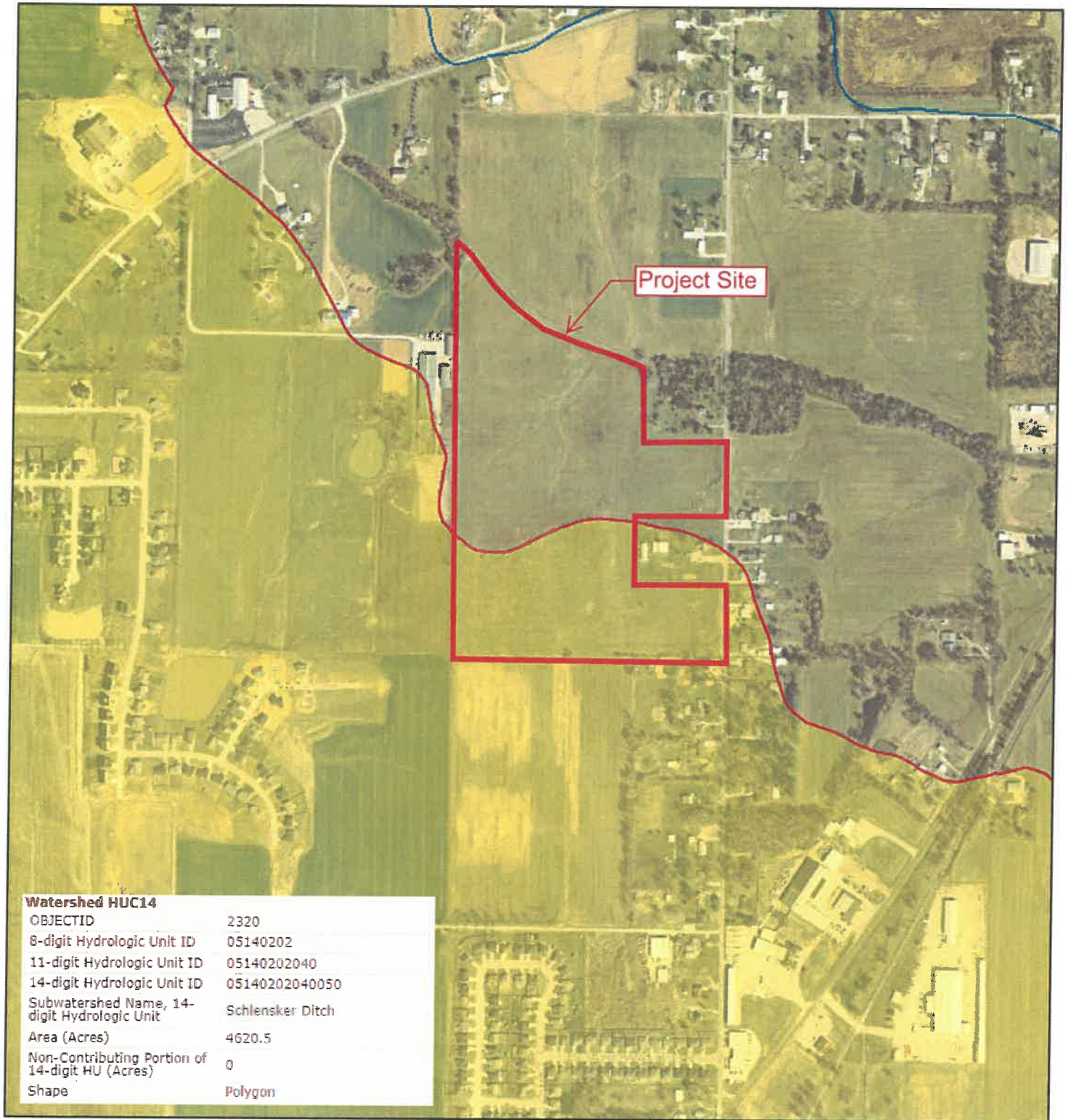
-  Watershed HUC14
-  2013 Orthophotos (State boundary)

1:8,000







# HUC 14 Map

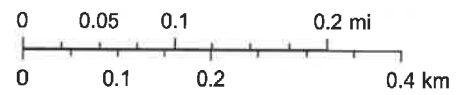


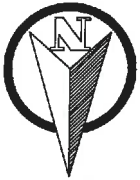
Watershed HUC14	
OBJECTID	2320
8-digit Hydrologic Unit ID	05140202
11-digit Hydrologic Unit ID	05140202040
14-digit Hydrologic Unit ID	05140202040050
Subwatershed Name, 14-digit Hydrologic Unit	Schlensker Ditch
Area (Acres)	4620.5
Non-Contributing Portion of 14-digit HU (Acres)	0
Shape	Polygon

November 12, 2021

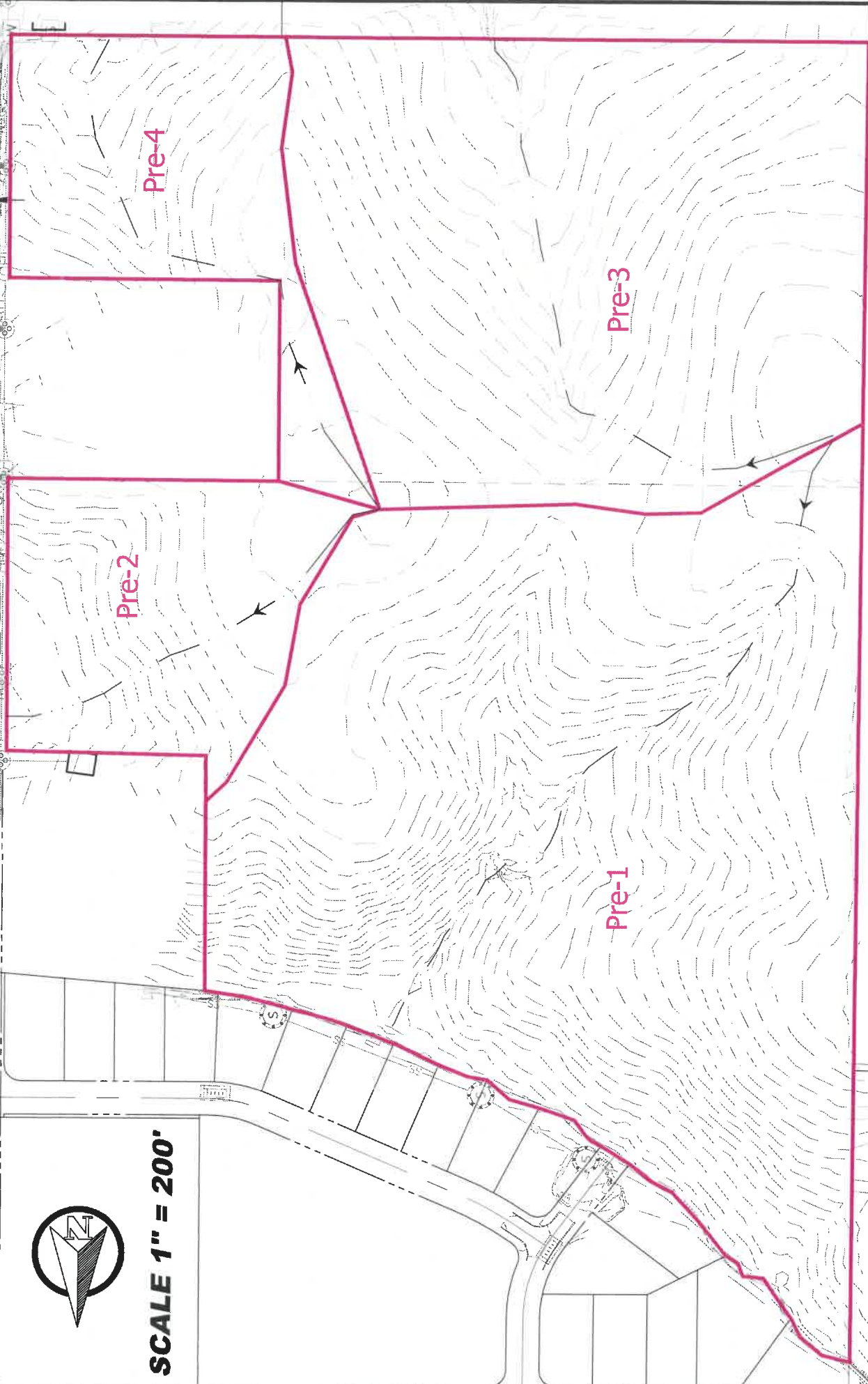
-  Watershed HUC14
-  2013 Orthophotos (State boundary)

1:8,000





**SCALE 1" = 200'**



**ARCHITECTS | ENGINEERS | SURVEYORS**

4800 Rosebud Ln.  
Newburgh, IN 47630  
812.464.9585 Phone  
812.464.2514 Fax  
morleycorp.com

**Pre-Developed Subbasins**  
Eleanor's Place  
13800 N Green River Road

Designed By:	JEM	Job Number:	11822.4.002-B
Drawn By:	CRS	Date:	3.24.2023
Filename:		11822 Civil Base 60' Pre Drainage	

Peak Runoff Calculation  
SUB-BASIN #1 Pre-Dev.

Project 11822  
Area (Sf) = 869,784

Area (Ac) = 19.97

Weighted Runoff Coefficient

Surface	Area	S.F.	=	0.00	AC.	c	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)	434,892	S.F.	=	9.98	AC.	0.35	3.49
Cultivated (5-10%)	434,892	S.F.	=	9.98	AC.	0.50	4.99
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	869,784			19.97			8.49

Wc = 0.4250

Time of Concentration

Overland Flow

Length, L (max 100ft) = 100 feet  
 Slope, S = 1.07%  
 Manning Coefficient, n = 0.170  
 P<sub>224</sub> = 3.3  
 $t_o = \text{Overland Flow Tc}$   
 $t_o = [0.42 \cdot (L^{0.8}) \cdot (n^{0.5})] / [P^{0.3} \cdot (S^{0.4})]$   
 $t_o = 13.70 \text{ min}$

Shallow Flow

Length, L (Paved or Unpaved) Unpaved = 1081 feet  
 Slope, S = 1.84%  
 Velocity, V = 2.19 ft/sec  
 $V = 16.1345 \cdot (S^{0.5})$   
 $= 2.189 \text{ ft/s} = 131.32 \text{ ft/min}$   
 $t_s = \text{Shallow Flow Tc}$   
 $t_s = (L/V) = 8.23 \text{ min}$

Channel Flow

Length, L = 0 feet  
 Difference in Elevation = 0 to 0  
 Slope, S = 0.000  
 Manning Coefficient, n = 0.000  
 Wetted Perimeter, Wp = 0 feet  
 Area, A = 0 sqft  
 Hydraulic Radius, R = 0  
 Velocity, V = 0 ft/s  
 $V = (1.49/n) \cdot R^{0.67} \cdot S^{0.5}$   
 $= 0 \text{ ft/s} = 0 \text{ ft/min}$   
 $t_c = \text{Channel Flow Tc}$   
 $t_c = (L/V) = 0.00 \text{ min}$

$t = \text{Total Time of Concentration}$   
 $t = \Sigma t_o + \Sigma t_s + \Sigma t_c$   
 $t = 21.93 \text{ (Min 5 Minutes)}$   
 $0.37 \text{ Hour}$

Intensity (Vanderburgh Co.)

$I_2 = 2.68 \text{ in/hr}$   
 $I_5 = 3.15 \text{ in/hr}$   
 $I_{10} = 3.55 \text{ in/hr}$   
 $I_{25} = 4.17 \text{ in/hr}$   
 $I_{50} = 4.71 \text{ in/hr}$   
 $I_{100} = 5.31 \text{ in/hr}$

Peak Runoff Rate

$Q_{yr} = CiA$

$Q_2 = 22.76 \text{ cfs}$   
 $Q_5 = 26.71 \text{ cfs}$   
 $Q_{10} = 30.15 \text{ cfs}$   
 $Q_{25} = 35.38 \text{ cfs}$   
 $Q_{50} = 39.94 \text{ cfs}$   
 $Q_{100} = 45.08 \text{ cfs}$



Peak Runoff Calculation  
SUB-BASIN #2 Pre-Dev.

Project 11822  
Area (Sf) = 183,753

Area (Ac) = 4.22

Weighted Runoff Coefficient

Surface	Area	S.F.	=		AC.	c	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)	183,753	S.F.	=	4.22	AC.	0.35	1.48
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	183,753			4.22			1.48

Wc = 0.3500

Time of Concentration

Overland Flow

Length, L (max 100ft) = 100 feet  
 Slope, S = 0.73%  
 Manning Coefficient, n = 0.170 Grass  
 $P_{224}$  = 3.3  
 $t_o$  = Overland Flow Tc  
 $t_o = [0.42 * (L^{0.6}) * (n^{0.8})] / [P^{0.2} * (S^{0.4})]$   
 $t_o = 15.96$  min

Shallow Flow

Length, L (Paved or Unpaved) Unpaved = 561 feet  
 Slope, S = 2.14%  
 Velocity, V = 2.36 ft/sec  
 $V = 16.1345 * (S^{0.5})$   
 $= 2.360$  ft/s = 141.62 ft/min  
 $t_s$  = Shallow Flow Tc  
 $t_s = (L/V) = 3.96$  min

Channel Flow

Length, L = 0 feet  
 Difference in Elevation = 0 to 0  
 Slope, S = 0.000  
 Manning Coefficient, n = 0.000  
 Wetted Perimeter, Wp = 0 feet  
 Area, A = 0 sqft  
 Hydraulic Radius, R =  
 Velocity, V = ft/s  
 $V = (1.49/n) * R^{0.67} * S^{0.5}$   
 $=$  ft/s = ft/min  
 $t_c$  = Channel Flow Tc  
 $t_c = (L/V) = 0.00$  min

t = Total Time of Concentration  
 $t = \Sigma t_o + \Sigma t_s + \Sigma t_c$   
 $t = 19.92$  (Min 5 Minutes)  
 $0.33$  Hour

Intensity (Vanderburgh Co.)

$I_2 = 2.86$  in/hr  
 $I_5 = 3.35$  in/hr  
 $I_{10} = 3.78$  in/hr  
 $I_{25} = 4.44$  in/hr  
 $I_{50} = 5.01$  in/hr  
 $I_{100} = 5.66$  in/hr

Peak Runoff Rate

$Q_{yr} = CiA$   
 $Q_2 = 4.22$  cfs  
 $Q_5 = 4.95$  cfs  
 $Q_{10} = 5.59$  cfs  
 $Q_{25} = 6.56$  cfs  
 $Q_{50} = 7.40$  cfs  
 $Q_{100} = 8.35$  cfs

Peak Runoff Calculation  
SUB-BASIN #3 Pre-Dev.

Project 11822  
Area (Sf) = 563,162

Area (Ac) = 12.93

Weighted Runoff Coefficient

Surface	Area	S.F.	=		AC.	c	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)	563,162	S.F.	=	12.93	AC.	0.35	4.52
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	563,162			12.93			4.52

Wc = 0.3500

Time of Concentration

Overland Flow

Length, L (max 100ft) = 100 feet  
 Slope, S = 0.77%  
 Manning Coefficient, n = 0.170 Grass  
 $P_{224}$  = 3.3  
 $t_o$  = Overland Flow Tc  
 $t_o = [0.42 * (L^{0.5}) * (n^{0.5})] / [P^{0.3} * (S^{0.4})]$   
 $t_o = 15.62$  min

Shallow Flow

Length, L (Paved or Unpaved) Unpaved = 893 feet  
 Slope, S = 1.65%  
 Velocity, V = 2.07 ft/sec  
 $V = 16.1345 * (S0.5)$   
 $= 2.073$  ft/s = 124.35 ft/min  
 $t_s$  = Shallow Flow Tc  
 $t_s = (L/V) = 7.18$  min

Channel Flow

Length, L = 0 feet  
 Difference in Elevation = 0 to 0  
 Slope, S =  
 Manning Coefficient, n = 0.000  
 Wetted Perimeter, Wp = 0 feet  
 Area, A = 0 sqft  
 Hydraulic Radius, R =  
 Velocity, V = ft/s  
 $V = (1.49/n) * R^{0.67} * S^{0.5}$   
 $=$  ft/s = ft/min  
 $t_c$  = Channel Flow Tc  
 $t_c = (L/V) = 0.00$  min

$t$  = Total Time of Concentration  
 $t = \Sigma t_o + \Sigma t_s + \Sigma t_c$   
 $t = 22.80$  (Min 5 Minutes)  
 0.38 Hour

Intensity (Vanderburgh Co.)

$I_2 = 2.61$  in/hr  
 $I_5 = 3.06$  in/hr  
 $I_{10} = 3.46$  in/hr  
 $I_{25} = 4.06$  in/hr  
 $I_{50} = 4.58$  in/hr  
 $I_{100} = 5.17$  in/hr

Peak Runoff Rate

$Q_{yr} = CiA$   
 $Q_2 = 11.81$  cfs  
 $Q_5 = 13.87$  cfs  
 $Q_{10} = 15.65$  cfs  
 $Q_{25} = 18.37$  cfs  
 $Q_{50} = 20.73$  cfs  
 $Q_{100} = 23.40$  cfs

Peak Runoff Calculation  
SUB-BASIN #4 Pre-Dev.

Project 11822  
Area (Sf) = 180,685

Area (Ac) = 4.15

Weighted Runoff Coefficient

Surface	Area	S.F.	=		AC.	c	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)	180,685	S.F.	=	4.15	AC.	0.35	1.45
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
				4.15			1.45

Wc = 0.3500

Time of Concentration

Overland Flow

Length, L (max 100ft) = 100 feet  
 Slope, S = 0.75%  
 Manning Coefficient, n = 0.170 Grass  
 $P_{224}$  = 3.3  
 $t_o$  = Overland Flow Tc  
 $t_o = [0.42 * (L^{0.5}) * (n^{0.5})] / [P^{0.5} * (S^{0.4})]$   
 $t_o = 15.79$  min

Shallow Flow

Length, L (Paved or Unpaved) Unpaved = 830 feet  
 Slope, S = 1.53%  
 Velocity, V = 2.00 ft/sec  
 $V = 16.1345 * (S^{0.5})$   
 $= 1.996$  ft/s = 119.74 ft/min  
 $t_s$  = Shallow Flow Tc  
 $t_s = (L/V) = 6.93$  min

Channel Flow

Length, L = 0 feet  
 Difference in Elevation = 0 to 0  
 Slope, S = 0.000  
 Manning Coefficient, n = 0.000  
 Wetted Perimeter, Wp = 0 feet  
 Area, A = 0 sqft  
 Hydraulic Radius, R =  
 Velocity, V = ft/s  
 $V = (1.49/n) * R^{0.67} * S^{0.5}$   
 $=$  ft/s = ft/min  
 $t_c$  = Channel Flow Tc  
 $t_c = (L/V) = 0.00$  min

$t$  = Total Time of Concentration  
 $t = \Sigma t_o + \Sigma t_s + \Sigma t_c$   
 $t = 22.72$  (Min 5 Minutes)  
 0.38 Hour

Intensity (Vanderburgh Co.)

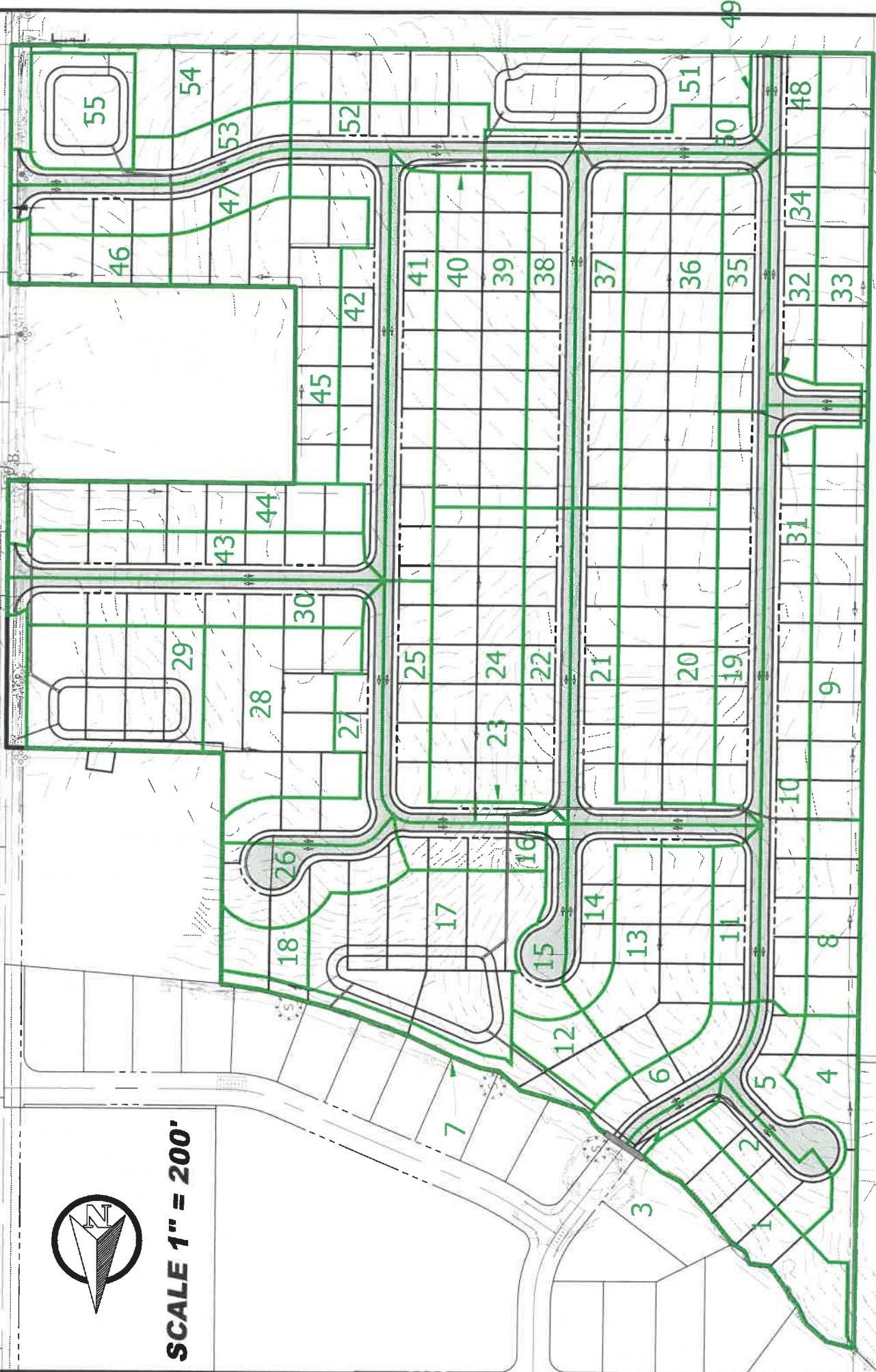
$I_2 = 2.62$  in/hr  
 $I_5 = 3.07$  in/hr  
 $I_{10} = 3.47$  in/hr  
 $I_{25} = 4.07$  in/hr  
 $I_{50} = 4.59$  in/hr  
 $I_{100} = 5.18$  in/hr

Peak Runoff Rate

$Q_{yr} = CiA$   
 $Q_2 = 3.80$  cfs  
 $Q_5 = 4.46$  cfs  
 $Q_{10} = 5.03$  cfs  
 $Q_{25} = 5.91$  cfs  
 $Q_{50} = 6.67$  cfs  
 $Q_{100} = 7.53$  cfs



**SCALE 1" = 200'**



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**Post-Developed Subbasins**  
Eleanor's Place  
13800 N Green River Road

Designed By:	JEM	Job Number:	11822-4-002-B
Drawn By:	CRS	Date:	3.24.2023
Filename:	11822 Civil Base 60' Pre Drainage		



## POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

### POST DEVELOPED SUB-BASINS (S.F.)

Surface	C	1	2	3	4	5	6	7	8	9	10
Structures & Pavement (<2%)	0.92										
Structures & Pavement (2-5%)	0.94	2,500	5,654	2,654	1,500	6,568	6,067		2,500	5,000	20,014
Structures & Pavement (5-10%)	0.96										
Structures & Pavement (>10%)	0.98	5,625	4,500		3,375	2,250	3,375		5,625	11,250	16,875
Gravel (10 yr storm)	0.50										
Gravel (25 yr storm)	0.60										
Gravel (50-100 yr storm)	0.65										
Lawn (<2%)	0.15										
Lawn (2-5%)	0.25		9,047	2,496		11,415			9,886	19,875	26,896
Lawn (5-10%)	0.40	18,183			12,303		11,580				
Lawn (>10%)	0.55	6,600			7,650			14,497	6,000	12,200	
Woodland Flat (<2%)	0.12										
Woodland Flat (2-5%)	0.24										
Woodland Rolling (5-10%)	0.36										
Woodland Hilly (>10%)	0.48										
Pasture Flat (<2%)	0.12										
Pasture Flat (2-5%)	0.25										
Pasture Rolling (5-10%)	0.36										
Pasture Hilly (>10%)	0.48										
Cultivated Flat (<2%)	0.20										
Cultivated Flat (2-5%)	0.35										
Cultivated Rolling (5-10%)	0.50										
Cultivated Hilly (>10%)	0.65										
Bare Soil	0.72										
Water	1.00										

Total SF	32,908	19,201	5,150	24,828	20,233	21,022	14,497	24,011	48,325	63,785
Total Acres	0.76	0.44	0.12	0.57	0.46	0.48	0.33	0.55	1.11	1.46
Weighted C	0.57	0.62	0.61	0.56	0.56	0.65	0.55	0.57	0.57	0.66

**POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS**

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

**SUB-BASINS (S.F.)**

Surface	C	11	12	13	14	15	16	17	18	19	20
Structures & Pavement (<2%)	0.92										
Structures & Pavement (2-5%)	0.94	5,886	1,000	5,000	9,830	4,017	5,187	3,000	1,000	14,171	7,500
Structures & Pavement (5-10%)	0.96										
Structures & Pavement (>10%)	0.98	4,500	2,250	11,250	4,500	1,125	3,938	6,750	2,250	11,250	16,875
Gravel (10 yr storm)	0.50										
Gravel (25 yr storm)	0.60										
Gravel (50-100 yr storm)	0.65										
Lawn (<2%)	0.15										
Lawn (2-5%)	0.25	7,550			11,505	11,390	7,094			18,661	37,605
Lawn (5-10%)	0.40		9,779	29,912				44,849	7,986		
Lawn (>10%)	0.55		1,152	4,092							5,520
Woodland Flat (<2%)	0.12										
Woodland Flat (2-5%)	0.24										
Woodland Rolling (5-10%)	0.36										
Woodland Hilly (>10%)	0.48										
Pasture Flat (<2%)	0.12										
Pasture Flat (2-5%)	0.25										
Pasture Rolling (5-10%)	0.36										
Pasture Hilly (>10%)	0.48										
Cultivated Flat (<2%)	0.20										
Cultivated Flat (2-5%)	0.35										
Cultivated Rolling (5-10%)	0.50										
Cultivated Hilly (>10%)	0.65										
Bare Soil	0.72										
Water	1.00							18,000			

Total SF	17,936	14,181	50,254	25,835	16,532	16,219	72,599	11,236	44,082	67,500
Total Acres	0.41	0.33	1.15	0.59	0.38	0.37	1.67	0.26	1.01	1.55
Weighted C	0.66	0.54	0.60	0.64	0.47	0.65	0.63	0.56	0.66	0.53

# POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

## SUB-BASINS (S.F.)

Surface	C	21	22	23	24	25	26	27	28	29	30
Structures & Pavement (<2%)	0.92										
Structures & Pavement (2-5%)	0.94	15,031	10,754	2,074	7,500	9,855	6,296	11,809	4,500	2,000	12,323
Structures & Pavement (5-10%)	0.96										
Structures & Pavement (>10%)	0.98	8,438	8,438		16,875	6,188	5,063	5,625	10,125	4,500	9,000
Gravel (10 yr storm)	0.50										
Gravel (25 yr storm)	0.60										
Gravel (50-100 yr storm)	0.65										
Lawn (<2%)	0.15										
Lawn (2-5%)	0.25	18,162	14,014	1,969	33,105	12,457	16,364	14,031	35,786	32,229	17,957
Lawn (5-10%)	0.40										
Lawn (>10%)	0.55				5,520				6,000		
Woodland Flat (<2%)	0.12										
Woodland Flat (2-5%)	0.24										
Woodland Rolling (5-10%)	0.36										
Woodland Hilly (>10%)	0.48										
Pasture Flat (<2%)	0.12										
Pasture Flat (2-5%)	0.25										
Pasture Rolling (5-10%)	0.36										
Pasture Hilly (>10%)	0.48										
Cultivated Flat (<2%)	0.20										
Cultivated Flat (2-5%)	0.35										
Cultivated Rolling (5-10%)	0.50										
Cultivated Hilly (>10%)	0.65										
Bare Soil	0.72										
Water	1.00									12,500	

Total SF	41,631	33,206	4,043	63,000	28,500	27,723	31,465	56,411	51,229	39,280
Total Acres	0.96	0.76	0.09	1.45	0.65	0.64	0.72	1.30	1.18	0.90
Weighted C	0.65	0.66	0.60	0.55	0.65	0.54	0.64	0.47	0.52	0.63



**POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS**

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

**SUB-BASINS (S.F.)**

Surface	C	31	32	33	34	35	36	37	38	39	40
Structures & Pavement (<2%)	0.92										
Structures & Pavement (2-5%)	0.94	2,755	2,755	4,000	7,858	8,684	8,500	16,401	14,183	8,500	2,074
Structures & Pavement (5-10%)	0.96										
Structures & Pavement (>10%)	0.98			9,000	6,750	6,750	19,125	9,563	9,563	19,125	
Gravel (10 yr storm)	0.50										
Gravel (25 yr storm)	0.60										
Gravel (50-100 yr storm)	0.65										
Lawn (<2%)	0.15										
Lawn (2-5%)	0.25	2,589	2,589	19,989	10,055	11,248	42,635	20,017	17,860	37,535	1,976
Lawn (5-10%)	0.40										
Lawn (>10%)	0.55			7,740			6,240			6,240	
Woodland Flat (<2%)	0.12										
Woodland Flat (2-5%)	0.24										
Woodland Rolling (5-10%)	0.36										
Woodland Hilly (>10%)	0.48										
Pasture Flat (<2%)	0.12										
Pasture Flat (2-5%)	0.25										
Pasture Rolling (5-10%)	0.36										
Pasture Hilly (>10%)	0.48										
Cultivated Flat (<2%)	0.20										
Cultivated Flat (2-5%)	0.35										
Cultivated Rolling (5-10%)	0.50										
Cultivated Hilly (>10%)	0.65										
Bare Soil	0.72										
Water	1.00										

Total SF	5,344	5,344	40,729	24,663	26,682	76,500	45,981	41,606	71,400	4,050
Total Acres	0.12	0.12	0.94	0.57	0.61	1.76	1.06	0.96	1.64	0.09
Weighted C	0.61	0.61	0.54	0.67	0.66	0.53	0.65	0.65	0.55	0.60

# POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

## SUB-BASINS (S.F.)

Surface	C	41	42	43	44	45	46	47	48	49	50
Structures & Pavement (<2%)	0.92										
Structures & Pavement (2-5%)	0.94	14,762	15,716	12,323	4,970	6,500	1,500	9,308	3,248	2,248	7,351
Structures & Pavement (5-10%)	0.96										
Structures & Pavement (>10%)	0.98	11,813	6,750	9,000	9,000	14,625	3,375	6,750	2,250		2,250
Gravel (10 yr storm)	0.50										
Gravel (25 yr storm)	0.60										
Gravel (50-100 yr storm)	0.65										
Lawn (<2%)	0.15										
Lawn (2-5%)	0.25	19,195	21,376	17,746	17,437	22,472	9,966	15,914	5,743	2,254	8,929
Lawn (5-10%)	0.40										
Lawn (>10%)	0.55				10,260	9,708	4,300				
Woodland Flat (<2%)	0.12										
Woodland Flat (2-5%)	0.24										
Woodland Rolling (5-10%)	0.36										
Woodland Hilly (>10%)	0.48										
Pasture Flat (<2%)	0.12										
Pasture Flat (2-5%)	0.25										
Pasture Rolling (5-10%)	0.36										
Pasture Hilly (>10%)	0.48										
Cultivated Flat (<2%)	0.20										
Cultivated Flat (2-5%)	0.35										
Cultivated Rolling (5-10%)	0.50										
Cultivated Hilly (>10%)	0.65										
Bare Soil	0.72										
Water	1.00										

Total SF	45,770	43,842	39,069	41,667	53,305	19,141	31,972	11,241	4,502	18,530
Total Acres	1.05	1.01	0.90	0.96	1.22	0.44	0.73	0.26	0.10	0.43
Weighted C	0.66	0.61	0.64	0.56	0.59	0.50	0.60	0.60	0.59	0.61

**POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS**

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

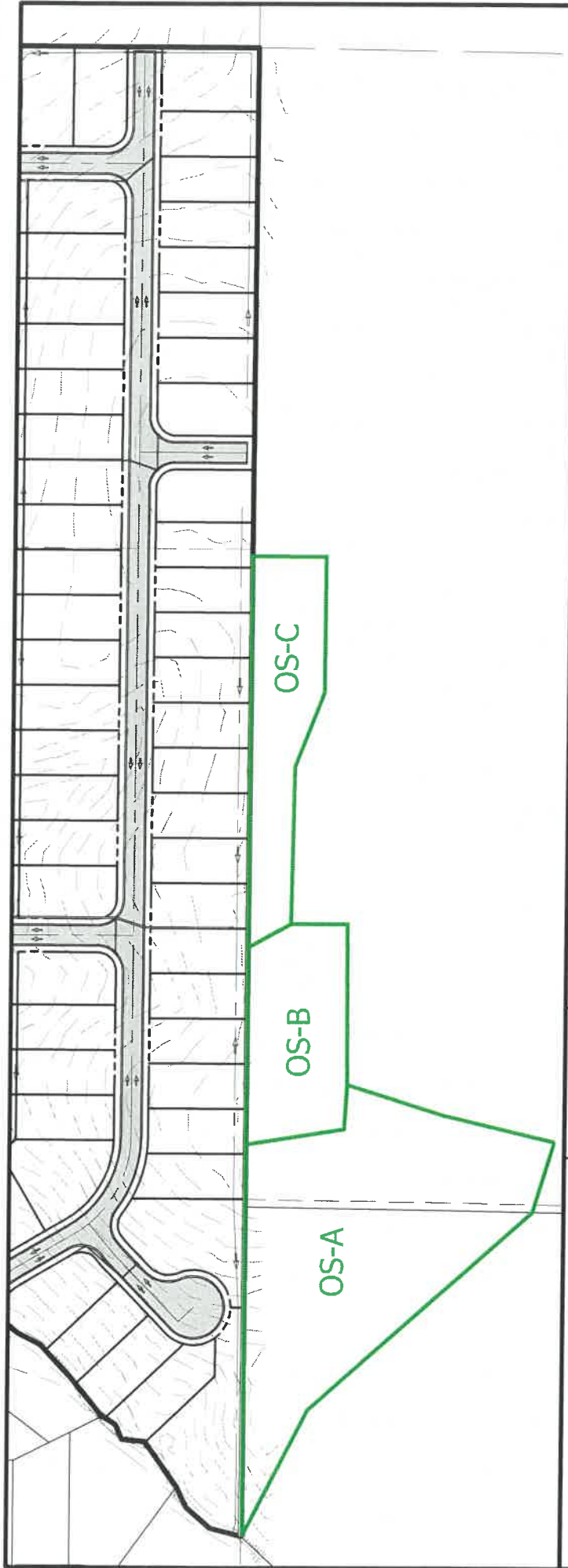
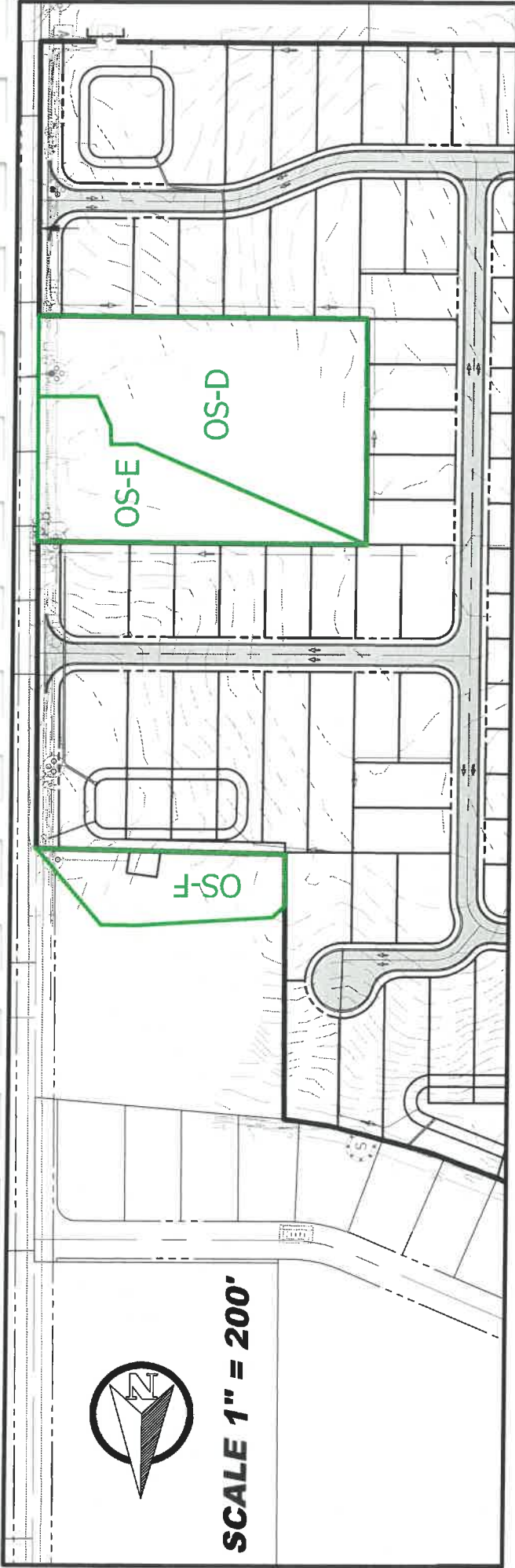
County: **Vanderburgh**  
 Date: **3/24/23**

Surface	C	51	52	53	54	55
Structures & Pavement (<2%)	0.92					
Structures & Pavement (2-5%)	0.94	3,500	6,778	8,308	3,600	
Structures & Pavement (5-10%)	0.96					
Structures & Pavement (>10%)	0.98	7,875	5,625	4,500	4,500	
Gravel (10 yr storm)	0.50					
Gravel (25 yr storm)	0.60					
Gravel (50-100 yr storm)	0.65					
Lawn (<2%)	0.15					
Lawn (2-5%)	0.25	38,588	9,184	10,725	19,931	17,163
Lawn (5-10%)	0.40					
Lawn (>10%)	0.55	6,450			6,000	
Woodland Flat (<2%)	0.12					
Woodland Flat (2-5%)	0.24					
Woodland Rolling (5-10%)	0.36					
Woodland Hilly (>10%)	0.48					
Pasture Flat (<2%)	0.12					
Pasture Flat (2-5%)	0.25					
Pasture Rolling (5-10%)	0.36					
Pasture Hilly (>10%)	0.48					
Cultivated Flat (<2%)	0.20					
Cultivated Flat (2-5%)	0.35					
Cultivated Rolling (5-10%)	0.50					
Cultivated Hilly (>10%)	0.65					
Bare Soil	0.72					
Water	1.00	13,000				10,500

Total SF	69,413	21,587	23,533	34,031	27,663
Total Acres	1.59	0.50	0.54	0.78	0.64
Weighted C	0.54	0.66	0.63	0.47	0.53



**SCALE 1" = 200'**



ARCHITECTS | ENGINEERS | SURVEYORS

4800 Rosebud Ln.  
Newburgh, IN 47630  
812.464.9585 Phone  
812.464.2514 Fax  
morleycorp.com

**Offsite Subbasins**  
Eleanor's Place  
13800 N Green River Road

Designed By:	JEM	Job Number:	11822.4.002-B
Drawn By:	CRS	Date:	3.24.2023
Filename:	11822 Civil Base 60' Pre Drainage		



**POST-DEVELOPED WEIGHTED RUNOFF COEFFICIENTS**

Project: **Eleanor's Place**  
 Project # **11822**  
 Engineer: **JEM**

County: **Vanderburgh**  
 Date: **3/24/23**

Surface	C	OS-A	OS-B	OS-C	OS-D	OS-E	OS-F
Structures & Pavement (<2%)	0.92						
Structures & Pavement (2-5%)	0.94	16,000	4,655	4,845	9,000	3,000	3,500
Structures & Pavement (5-10%)	0.96						
Structures & Pavement (>10%)	0.98	4,500	8,820	9,180	7,500	1,000	3,000
Gravel (10 yr storm)	0.50						
Gravel (25 yr storm)	0.60						
Gravel (50-100 yr storm)	0.65						
Lawn (<2%)	0.15						
Lawn (2-5%)	0.25		23,520	24,480	71,500	39,000	20,350
Lawn (5-10%)	0.40	96,000					
Lawn (>10%)	0.55						
Woodland Flat (<2%)	0.12						
Woodland Flat (2-5%)	0.24						
Woodland Rolling (5-10%)	0.36						
Woodland Hilly (>10%)	0.48						
Pasture Flat (<2%)	0.12						
Pasture Flat (2-5%)	0.25						
Pasture Rolling (5-10%)	0.36						
Pasture Hilly (>10%)	0.48						
Cultivated Flat (<2%)	0.20						
Cultivated Flat (2-5%)	0.35						
Cultivated Rolling (5-10%)	0.50						
Cultivated Hilly (>10%)	0.65						
Bare Soil	0.72						
Water	1.00						

Total SF	116,500	36,995	38,505	88,000	43,000	26,850
Total Acres	2.67	0.85	0.88	2.02	0.99	0.62
Weighted C	0.50	0.51	0.51	0.38	0.32	0.42

# POST-DEVELOPED SUB-BASIN CALCULATIONS

Indiana LTAP Stormwater Drainage Manual

**Project:** Eleanor's Place

**Project #** 11822

**Engineer:** JEM

**County:** Vanderburgh

**Date:** 3/24/23

**Design Period:** 25 year

Sub-basin	Area (ac.)	Weighted C	Overland Flow L (ft)	Overland Flow ΔH (ft)	Overland Flow S (%)	Overland Flow t <sub>s</sub> (mins)	Shallow Flow L (ft)	Shallow Flow ΔH (ft)	Shallow Flow Type (Paved/Unpaved)	Shallow Flow S (%)	Shallow Flow t <sub>s</sub> (mins)	Total Time of Conc. t <sub>s</sub> (mins)	I(10) (in/hr)	Q(10) (CFS)	I(25) (in/hr)	Q(25) (CFS)	I(100) (in/hr)	Q(100) (CFS)
1	0.76	0.57										6.00	6.37	2.74	7.47	3.22	9.52	4.10
2	0.44	0.62										7.00	6.10	1.68	7.15	1.97	9.11	2.51
3	0.12	0.61										5.00	6.66	0.48	7.81	0.56	9.95	0.71
4	0.57	0.56										11.00	5.18	1.65	6.08	1.93	7.74	2.46
5	0.46	0.56										7.00	6.10	1.57	7.15	1.84	9.11	2.35
6	0.48	0.65										8.00	5.84	1.83	6.86	2.15	8.74	2.74
7	0.33	0.55										5.00	6.66	1.22	7.81	1.43	9.95	1.82
8	0.55	0.57										11.00	5.18	1.62	6.08	1.90	7.74	2.42
9	1.11	0.57										14.00	4.63	2.91	5.43	3.42	6.92	4.35
10	1.46	0.66										11.00	5.18	5.00	6.08	5.87	7.74	7.48
11	0.41	0.66										9.00	5.61	1.52	6.58	1.79	8.38	2.28
12	0.33	0.54										12.00	4.98	0.88	5.85	1.03	7.45	1.32
13	1.15	0.60										10.00	5.39	3.70	6.32	4.34	8.05	5.54
14	0.59	0.64										8.00	5.84	2.22	6.86	2.60	8.74	3.31
15	0.38	0.47										7.00	6.10	1.08	7.15	1.27	9.11	1.62
16	0.37	0.65										5.00	6.66	1.61	7.81	1.88	9.95	2.40
17	1.67	0.63										10.00	5.39	5.61	6.32	6.58	8.05	8.39
18	0.26	0.56										8.00	5.84	0.85	6.86	1.00	8.74	1.27
19	1.01	0.66										11.00	5.18	3.45	6.08	4.05	7.74	5.16
20	1.55	0.53										11.00	5.18	4.28	6.08	5.03	7.74	6.40
21	0.96	0.65										11.00	5.18	3.20	6.08	3.76	7.74	4.79
22	0.76	0.66										11.00	5.18	2.60	6.08	3.05	7.74	3.89
23	0.09	0.60										5.00	6.66	0.37	7.81	0.44	9.95	0.56

## POST-DEVELOPED SUB-BASIN CALCULATIONS

Indiana LTAP Stormwater Drainage Manual

Project: **Eleanor's Place**

County: **Vanderburgh**

Project # **11822**

Date: **3/24/23**

Engineer: **JEM**

Design Period: **25 year**

Sub-basin	Area (ac.)	Weighted C	Overland Flow L (ft)	Overland Flow ΔH (ft)	Overland Flow S (%)	Overland Flow t <sub>b</sub> (mins)	Shallow Flow L (ft)	Shallow Flow ΔH (ft)	Shallow Flow Type (Paved/Unpaved)	Shallow Flow S (%)	Shallow Flow t <sub>b</sub> (mins)	Total Time of Conc. t <sub>c</sub> (mins)	I(10) (in/hr)	Q(10) (CFS)	I(25) (in/hr)	Q(25) (CFS)	I(100) (in/hr)	Q(100) (CFS)
24	1.45	0.55										11.00	5.18	4.15	6.08	4.87	7.74	6.20
25	0.65	0.65										11.00	5.18	2.19	6.08	2.57	7.74	3.28
26	0.64	0.54										13.00	4.80	1.65	5.63	1.94	7.18	2.47
27	0.72	0.64										9.00	5.61	2.59	6.58	3.04	8.38	3.87
28	1.30	0.47										11.00	5.18	3.14	6.08	3.68	7.74	4.69
29	1.18	0.52										10.00	5.39	3.32	6.32	3.90	8.05	4.96
30	0.90	0.63										5.00	6.66	3.80	7.81	4.46	9.95	5.69
31	0.12	0.61										5.00	6.66	0.49	7.81	0.58	9.95	0.74
32	0.12	0.61										5.00	6.66	0.49	7.81	0.58	9.95	0.74
33	0.94	0.54										11.00	5.18	2.60	6.08	3.05	7.74	3.88
34	0.57	0.67										10.00	5.39	2.04	6.32	2.40	8.05	3.05
35	0.61	0.66										11.00	5.18	2.09	6.08	2.45	7.74	3.13
36	1.76	0.53										11.00	5.18	4.85	6.08	5.70	7.74	7.26
37	1.06	0.65										11.00	5.18	3.54	6.08	4.16	7.74	5.30
38	0.96	0.65										11.00	5.18	3.23	6.08	3.79	7.74	4.83
39	1.64	0.55										11.00	5.18	4.70	6.08	5.52	7.74	7.03
40	0.09	0.60										5.00	6.66	0.37	7.81	0.44	9.95	0.56
41	1.05	0.66										12.00	4.98	3.46	5.85	4.06	7.45	5.18
42	1.01	0.61										11.00	5.18	3.18	6.08	3.73	7.74	4.75
43	0.90	0.64										5.00	6.66	3.80	7.81	4.45	9.95	5.67
44	0.96	0.56										11.00	5.18	2.79	6.08	3.28	7.74	4.18
45	1.22	0.59										10.00	5.39	3.88	6.32	4.56	8.05	5.81
46	0.44	0.50										8.00	5.84	1.28	6.86	1.51	8.74	1.92



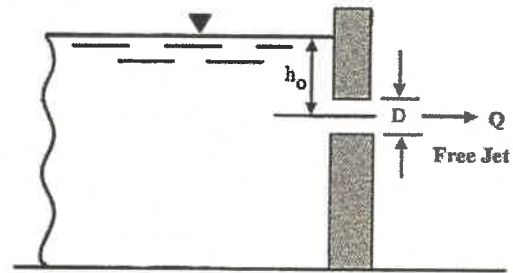




### BASIN DISCHARGE AND STORAGE VOLUME

**Orifice:**  $Q = C_d A_o \sqrt{2gh_o}$  LTAP 6.3.2

Pipe Dia. 0 (inch)  
 D (inch) 0.00 Orifice diameter  
 A<sub>o</sub> (s.f.) 0.00 Area of orifice  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 0.00 Head at Inlet  
 h<sub>o</sub> (ft) 0.00 Head at center of orifice  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Pipe Flow:**  $Q = A_p \left( \frac{h_p}{\frac{K_e + K_o}{2g} + \frac{2.87n^2L}{D^{4/3}}} \right)^{1/2}$  LTAP 6.3.5

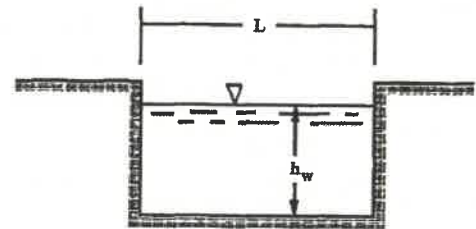
Pipe Dia. 24 (inch)  
 A<sub>p</sub> (s.f.) 3.14 Area of Pipe  
 n 0.012 Manning roughness coef.  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 2.25 Head at invert  
 h<sub>p</sub> (ft) 1.25 Head at center of pipe  
 L (ft) 51 Length of pipe  
 K<sub>e</sub> 0.85 Entrance Loss  
 K<sub>o</sub> 1.00 Outlet Loss

Q= 18.24 CFS @ 25 year water elevation

Not used

**Rectangular Weir:**  $Q = \frac{2}{3} C_d \sqrt{2g} L h_w^{3/2}$  LTAP 6.3.3

L (ft) 0 Length of the weir  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 h<sub>w</sub> (ft) 0.00 Head above weir  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Storage:**

Stage	Surface Area (S.F.)	Cum. Storage Vol. (C.F.)	Notes
402.50	17,686		Pool
403.50	20,141	18,914	
404.50	22,697	21,419	
404.75	23,352	5,756	25 Year Water Elev.
405.25			EO Elevation
	Available Storage:	46,089	1.06 AC-FT
	Required Storage:	38,372	0.88 AC-FT
		83%	Basin Capacity

**VANDEBURGH COUNTY DRAINAGE BOARD  
FORM 800 (Northeast Basin)**

PROJECT: **Eleanor's Place**                      DETENTION FACILITY DESIGN RETURN PERIOD:      25 YRS  
11822  
DESIGNER: **JEM**    RELEASE RATE RETURN PERIOD:      10 YRS

UNDEVELOPED WATERSHED AREA (Au)	4.22	ACRES
TIME OF CONCENTRATION (UNDEVELOPED WATERSHED)	19.92	MINUTES
RAINFALL INTENSITY (Iu):	3.78	INCHES/HR
UNDEVELOPED RUNOFF COEFFICIENT (Cu):	0.35	
UNDEVELOPED RUNOFF RATE (Q = Cu*Iu*A):		5.59 CFS
DEVELOPED WATERSHED AREA (Ad)	6.83	ACRES
DEVELOPED RUNOFF COEFFICIENT (Cd):	0.51	
UNDETAINED DEVELOPED RUNOFF RATE		0.00 CFS
ALLOWABLE OFF SITE PASS THROUGH RATE		2.88
ALLOWABLE PIPE RELEASE RATE		8.47 CFS
ACTUAL DISCHARGE PIPE OUTFLOW		3.33 CFS

STORM DURATION Td (HRS)	RAINFALL INTENSITY Id (INCH/HR)	INFLOW RATE I(Td) (Cd*Id*Ad) (CFS)	OUTFLOW RATE Q (actual) (CFS)	STORAGE RATE I(Td)-Q (CFS)	REQUIRED STORAGE (I(Td)-Q)*Td/12 (ACRE.FT)
0.08	7.811	27.21	3.33	23.88	0.16
0.17	6.321	22.02	3.33	18.69	0.26
0.25	5.241	18.25	3.33	14.92	0.31
0.50	3.307	11.52	3.33	8.19	0.34
0.67	2.581	8.99	3.33	5.66	0.31
0.75	2.310	8.05	3.33	4.71	0.29
1.00	2.174	7.57	3.33	4.24	0.35
1.50	1.668	5.81	3.33	2.48	0.31
2.00	1.366	4.76	3.33	1.43	0.24
2.50	1.163	4.05	3.33	0.72	0.15
3.00	1.017	3.54	3.33	0.21	0.05
4.00	0.820	2.86	3.33	-0.48	-0.16
5.00	0.691	2.41	3.33	-0.92	-0.38
6.00	0.600	2.09	3.33	-1.24	-0.61
7.00	0.532	1.85	3.33	-1.48	-0.85
8.00	0.480	1.67	3.33	-1.66	-1.10
9.00	0.437	1.52	3.33	-1.81	-1.35
10.00	0.402	1.40	3.33	-1.93	-1.60

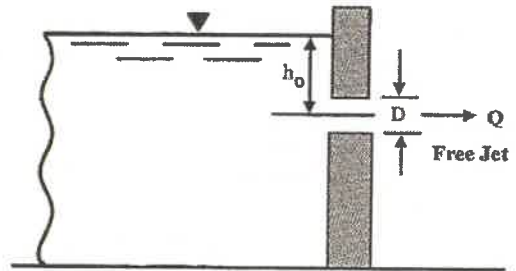
PEAK STORAGE (ACRE-FT)	0.35
PEAK STORAGE (CUBIC FT)	15,275



**BASIN DISCHARGE AND STORAGE VOLUME**

**Orifice:**  $Q = C_d A_o \sqrt{2gh_o}$  LTAP 6.3.2

Pipe Dia. 0 (inch)  
 D (inch) 0.00 Orifice diameter  
 A<sub>o</sub> (s.f.) 0.00 Area of orifice  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 0.00 Head at Inlet  
 h<sub>o</sub> (ft) 0.00 Head at center of orifice  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Pipe Flow:**  $Q = A_p \left( \frac{h_p}{\frac{K_e + K_o}{2g} + \frac{2.87n^2L}{D^{4/3}}} \right)^{1/2}$  LTAP 6.3.5

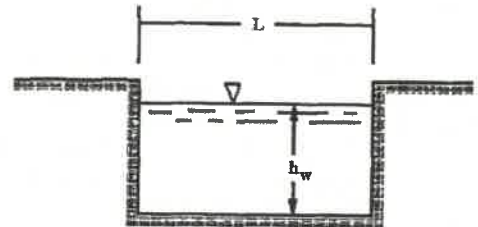
Pipe Dia. 12 (inch)  
 A<sub>p</sub> (s.f.) 0.79 Area of Pipe  
 n 0.012 Manning roughness coef.  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 1.50 Head at invert  
 h<sub>p</sub> (ft) 1.00 Head at center of pipe  
 L (ft) 65 Length of pipe  
 K<sub>e</sub> 0.85 Entrance Loss  
 K<sub>o</sub> 1.00 Outlet Loss

Q= 3.33 CFS @ 25 year water elevation

Not used

**Rectangular Weir:**  $Q = \frac{2}{3} C_d \sqrt{2g} L h_w^{3/2}$  LTAP 6.3.3

L (ft) 0 Length of the weir  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 h<sub>w</sub> (ft) 0.00 Head above weir  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Storage:**

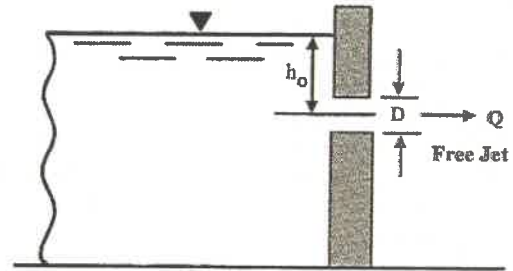
Stage	Surface Area (S.F.)	Cum. Storage Vol. (C.F.)	Notes
412.00	12,177		Pool
412.50	13,149	6,332	
413.50	15,171	14,160	25 Year Water Elev.
414.00	16,219		EO Elevation
Available Storage:		20,492	0.47 AC-FT
Required Storage:		15,275	0.35 AC-FT
		75%	Basin Capacity



**BASIN DISCHARGE AND STORAGE VOLUME**

**Orifice:**  $Q = C_d A_o \sqrt{2gh_o}$  LTAP 6.3.2

Pipe Dia. 0 (inch)  
 D (inch) 0.00 Orifice diameter  
 A<sub>o</sub> (s.f.) 0.00 Area of orifice  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 0.00 Head at Inlet  
 h<sub>o</sub> (ft) 0.00 Head at center of orifice  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Pipe Flow:**  $Q = A_p \left( \frac{h_p}{\frac{K_e + K_o}{2g} + \frac{2.87n^2L}{D^{4/3}}} \right)^{1/2}$  LTAP 6.3.5

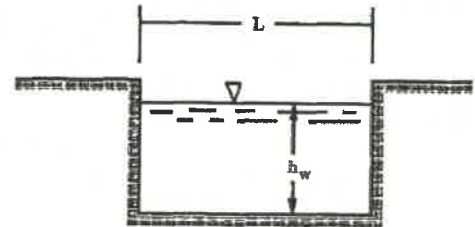
Pipe Dia. 18 (inch)  
 A<sub>p</sub> (s.f.) 1.77 Area of Pipe  
 n 0.012 Manning roughness coef.  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 H (ft) 2.25 Head at invert  
 h<sub>p</sub> (ft) 1.50 Head at center of pipe  
 L (ft) 36 Length of pipe  
 K<sub>e</sub> 0.85 Entrance Loss  
 K<sub>o</sub> 1.00 Outlet Loss

Q= 11.19 CFS @ 25 year water elevation

Not used

**Rectangular Weir:**  $Q = \frac{2}{3} C_d \sqrt{2g} L h_w^{3/2}$  LTAP 6.3.3

L (ft) 0 Length of the weir  
 g (f/s<sup>2</sup>) 32.2 Acceleration due to gravity  
 h<sub>w</sub> (ft) 0.00 Head above weir  
 C<sub>d</sub> 0.61 Discharge coefficient



Q= 0.00 CFS

Not used

**Storage:**

Stage	Surface Area (S.F.)	Cum. Storage Vol. (C.F.)	Notes
410.50	12,696		Pool
410.75	13,243	3,242	
411.75	15,495	14,369	
412.75	17,848	16,672	25 Year Water Elev.
413.25			EO Elevation
	Available Storage:	34,283	0.79 AC-FT
	Required Storage:	25,519	0.59 AC-FT
		74%	Basin Capacity

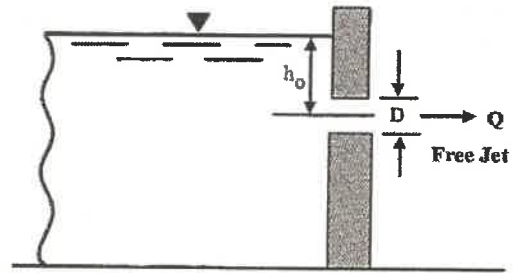




### BASIN DISCHARGE AND STORAGE VOLUME

**Orifice:**  $Q = C_d A_o \sqrt{2gh_o}$  LTAP 6.3.2

Pipe Dia.	12	(inch)
D (inch)	7.00	Orifice diameter
A <sub>o</sub> (s.f.)	0.27	Area of orifice
g (f/s <sup>2</sup> )	32.2	Acceleration due to gravity
H (ft)	1.75	Head at Inlet
h <sub>o</sub> (ft)	1.46	Head at center of orifice
C <sub>d</sub>	0.61	Discharge coefficient



Q= 1.58 CFS

Not used

**Pipe Flow:**  $Q = A_p \left( \frac{h_p}{\frac{K_e + K_o}{2g} + \frac{2.87n^2L}{D^{4/3}}} \right)^{1/2}$  LTAP 6.3.5

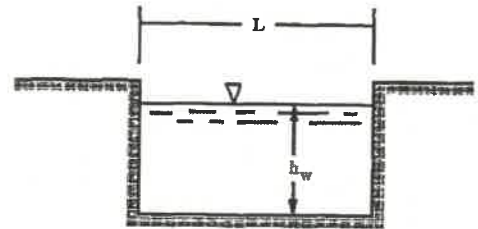
Pipe Dia.	0	(inch)
A <sub>p</sub> (s.f.)	0.00	Area of Pipe
n	0.012	Manning roughness coef.
g (f/s <sup>2</sup> )	32.2	Acceleration due to gravity
H (ft)	0.00	Head at invert
h <sub>p</sub> (ft)	0.00	Head at center of pipe
L (ft)	0	Length of pipe
K <sub>e</sub>	0.85	Entrance Loss
K <sub>o</sub>	1.00	Outlet Loss

Q= #DIV/0! CFS @ 25 year water elevation

Not used

**Rectangular Weir:**  $Q = \frac{2}{3} C_d \sqrt{2gL} h_w^{3/2}$  LTAP 6.3.3

L (ft)	0	Length of the weir
g (f/s <sup>2</sup> )	32.2	Acceleration due to gravity
h <sub>w</sub> (ft)	0.00	Head above weir
C <sub>d</sub>	0.61	Discharge coefficient



Q= 0.00 CFS

Not used

**Storage:**

Stage	Surface Area (S.F.)	Cum. Storage Vol. (C.F.)	Notes
412.75	10,451		Pool
413.50	10,839	7,984	
414.50	12,455	11,647	25 Year Water Elev.
415.00			EO Elevation
Available Storage:		19,631	0.45 AC-FT
Required Storage:		17,142	0.39 AC-FT
		87%	Basin Capacity