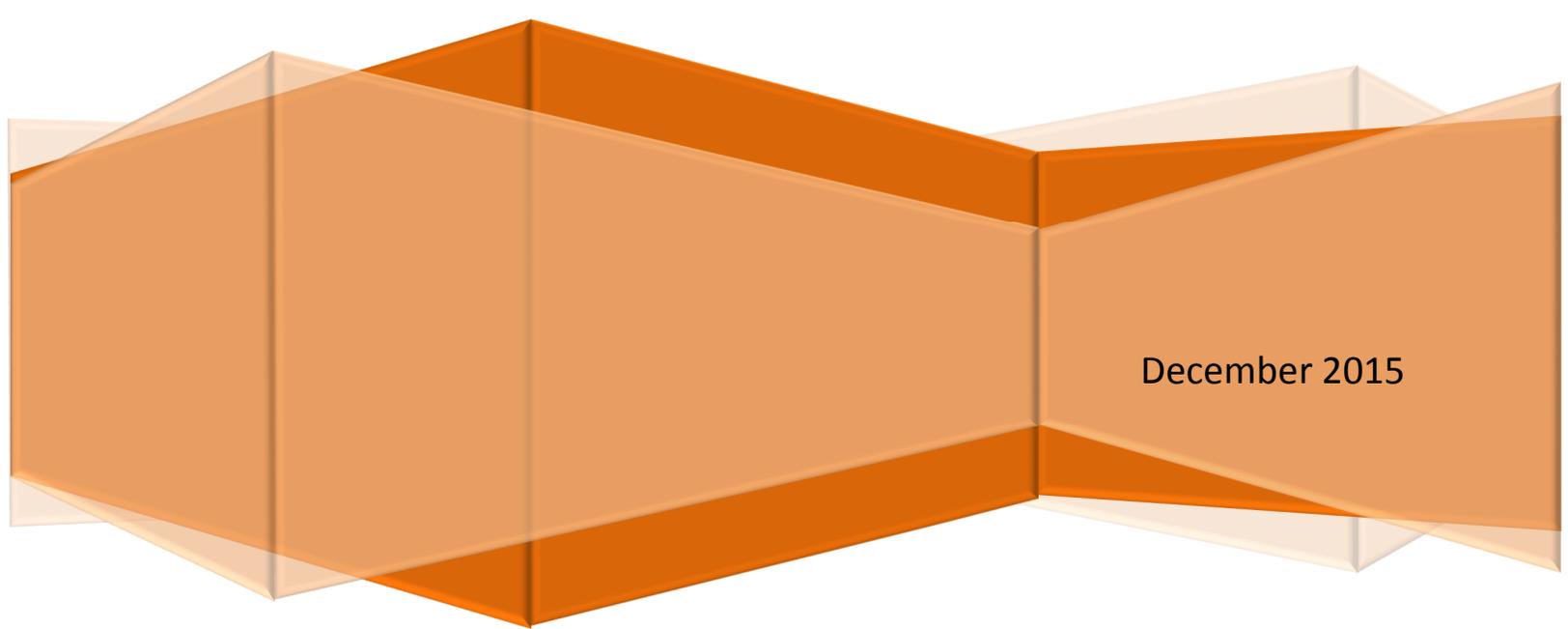


ARCHITECTS. ENGINEERS. PLANNERS.



Deer Run

Stormwater Management Plan

A large, decorative graphic at the bottom of the page. It consists of several overlapping, semi-transparent orange and brown geometric shapes, including rectangles and trapezoids, arranged in a horizontal, somewhat abstract pattern. The shapes have a 3D effect with shadows and highlights.

December 2015

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I. Time of Concentration

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea A RT DITCH - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: B

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area	0 acres
Post Construction Impervious Area	0.33 acres
Total Area	18.5 acres
% of impervious area	1.78%

Time of Concentration

tc = 0.23 hr

Sheet Flow: 50 ft at 0.06 ft/ft Tc = 0.01 hr

Shallow Concentrated Flow: 255ft at 0.27 ft/ft Tc = 0.12 hr

Open Channel Flow: 290 ft at 0.64 ft/ft Tc = 0.10 hr

Water Quality Volume (WQv)

$$WQ_v = C * (P/12) * A$$

$$C = 0.0536$$

$$I = 0.0178$$

$$P = 0.75 \text{ inches}$$

$$A = 0.8033 \text{ acre}$$

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$$WQ_v = 0.0027 \text{ ac-ft}$$

$$117.1418 \text{ CU FT}$$

Available Storage in Ditch: 3,010 CF

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea A LT DITCH - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: B

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area	0 acres
Post Construction Impervious Area	0.33 acres
Total Area	18.5 acres
% of impervious area	1.78%

Time of Concentration

tc = 0.13 hr

Sheet Flow: 10 ft at 0.06 ft/ft Tc = 0.0004 hr

Open Channel Flow: 200 ft at 0.64 ft/ft Tc = 0.13 hr

Water Quality Volume (WQv)

$$WQ_v = C * \left(\frac{P}{12}\right) * A$$

C = 0.0536
I = 0.0178
P = 0.75 inches
A = 0.1563 acre

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$$WQ_v = 0.0005 \text{ ac-ft}$$

$$22.79256 \text{ CU FT}$$

Available Storage in Ditch: 2,062 CF

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea B RT DITCH #1 - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: D

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area	0.0259 acres
Post Construction Impervious Area	0.4851 acres
Total Area	16.1 acres
% of impervious area	3.01%

Time of Concentration

tc = 0.13 hr

Sheet Flow: 50 ft at 0.02 ft/ft Tc = 0.02 hr

Open Channel Flow: 185 ft at .0452 ft/ft Tc = 0.11 hr

Water Quality Volume (WQv)

$$WQ_V = C * \left(\frac{P}{12}\right) * A$$

C = 0.0626
I = 0.0301
P = 0.75 inches
A = 0.6811 acre

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$$WQ_V = 0.0027 \text{ ac-ft}$$

$$116.1462 \text{ CU FT}$$

Available Storage in Ditch: 2,925 CF

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea B RT DITCH #2 - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: D

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area	0.0259 acres
Post Construction Impervious Area	0.4851 acres
Total Area	16.1 acres
% of impervious area	3.01%

Time of Concentration

tc = 0.13 hr

Sheet Flow: 50 ft at 0.02 ft/ft Tc = 0.02 hr

Open Channel Flow: 185 ft at .0452 ft/ft Tc = 0.11 hr

Water Quality Volume (WQv)

$$WQ_V = C * \left(\frac{P}{12}\right) * A$$

C = 0.0626
I = 0.0301
P = 0.75 inches
A = 0.7937 acre

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$$WQ_V = 0.0031 \text{ ac-ft}$$

$$135.3476 \text{ CU FT}$$

Available Storage in Ditch: 50,490 CF

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea B LT DITCH #1 - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: D

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area 0.0259 acres
Post Construction Impervious Area 0.4851 acres
Total Area 16.1 acres
% of impervious area 3.01%

Time of Concentration

tc = 0.17 hr

Sheet Flow: 16 ft at 0.02 ft/ft Tc = 0.00 hr

Open Channel Flow: 165 ft at .0452 ft/ft Tc = 0.17 hr

Water Quality Volume (WQv)

$$WQ_v = C * \left(\frac{P}{12}\right) * A$$

C = 0.0626
I = 0.0301
P = 0.75 inches
A = 0.1534 acre

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$WQ_v = 0.0006$ ac-ft
Available Storage in Ditch: 5(3,162 CF

26.1589 CU FT

Deer Run Project - Dublin, OH

Functional Classification : Local Road

Subarea B LT DITCH #2 - refer to Drainage Maps for Location

Stormwater Management Requirements

Location of Project: River Corridor
Quantity Requirements: Not applicable
Quality Requirements: 0.75 inch event

Type of Drainage System: Open Channel
Hydrologic Soil Group: D

Ditches shall be designed to carry the 10 year, 24 hr storm.

Open Channels shall be designed with one foot of freeboard above the design water surface elevation for the 10 year, 24-hour storm.

The 100 yr, 24 hour storm shall not encroach into proposed or existing residential dwellings or places of business.

Method of treating water quality for the project: *Bioretention Swale*

Pre Construction Impervious Area 0.0259 acres
Post Construction Impervious Area 0.4851 acres
Total Area 16.1 acres
% of impervious area 3.01%

Time of Concentration

tc = 0.17 hr

Sheet Flow: 16 ft at 0.02 ft/ft Tc = 0.00 hr

Open Channel Flow: 165 ft at .0452 ft/ft Tc = 0.17 hr

Water Quality Volume (WQv)

$$WQ_V = C * (P/12) * A$$

C = 0.0626
I = 0.0301
P = 0.75 inches
A = 0.341 acre

Where,

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

i = fraction of post - const. impervious surface

P = 0.75 Precipitation Depth

A = Area tributary to basin, acres

$WQ_V = 0.0013$ ac-ft
Available Storage in Ditch: 5 6,798 CF

58.14983 CU FT

II. Storm Sewer Design

Subarea B

Due to the highpoint location, the proposed ditch could not be grading to the outfall located at the end of the cul-de-sac. Therefore, a proposed storm system was designed. The location of the proposed structures is at Station 1+00 and crosses perpendicular to the roadway. Two catch basins collect the ditch drainage into 12" conduits and outlet them to a roadway ditch that drains to Deer Run. There was no proposed storm system needed for Subarea A.



STORM SEWER SYSTEM

PID : **Date :** 11/09/2015 **Project :** Deer Run **Location :** Dublin, OH - Subarea B **Designer :** ACF

Description : Storm Sewer Design Sta 1+00

Rainfall Area: C **Just Full Capacity Frequency (yrs.) :** 25 **Hydraulic Gradient Frequency (yrs.) :** 50

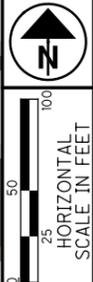
Minimum Pipe Size : 12.00 **Tailwater Elevation (ft.):** 849.00

JUNCTION	STATION	ΔAREA	ΔCA	BEGIN	RAINFALL	DISCHARGE	PIPE	F/L PIPE	MEAN	JUST FULL	FRICT	HYGREL.	COVER	COVER	INLET TYPE					
From	To	ΣAREA	ΣCA	TIME	INTENSITY	(cfs.)	DIAM.	LENGTH	SLOPE	IN / OUT	VEL	CAPACITY	SLOPE	IN / OUT	HYGR	MINUS	CROWN	'n'		
		(acres)		(min.)	(25 yrs.)	(60 yrs.)	(in.)	(ft.)	(ft./ft.)	(ft.)	(fps.)	(cfs.)	(ft./ft.)	(ft.)	(ft.)	(ft.)	(ft.)			
0	1	0.68	0.37	10.00	6.49	6.98	2.4	2.6	12	38.0	0.0054	848.30	3.09	2.44	0.0071	849.71	850.42	0.71	1.12	CB 2-2B
	begin	0.68	0.37									848.09				849.44	850.35			0.015
1	END	0.15	0.08	10.20	6.43	6.98	2.9	3.2	12	41.0	0.0079	848.09	3.76	2.95	0.0107	849.44	850.35	0.91	1.26	CB 2-2B
	final	0.83	0.46									847.77				849.00	850.21			0.015

III. BMP Design

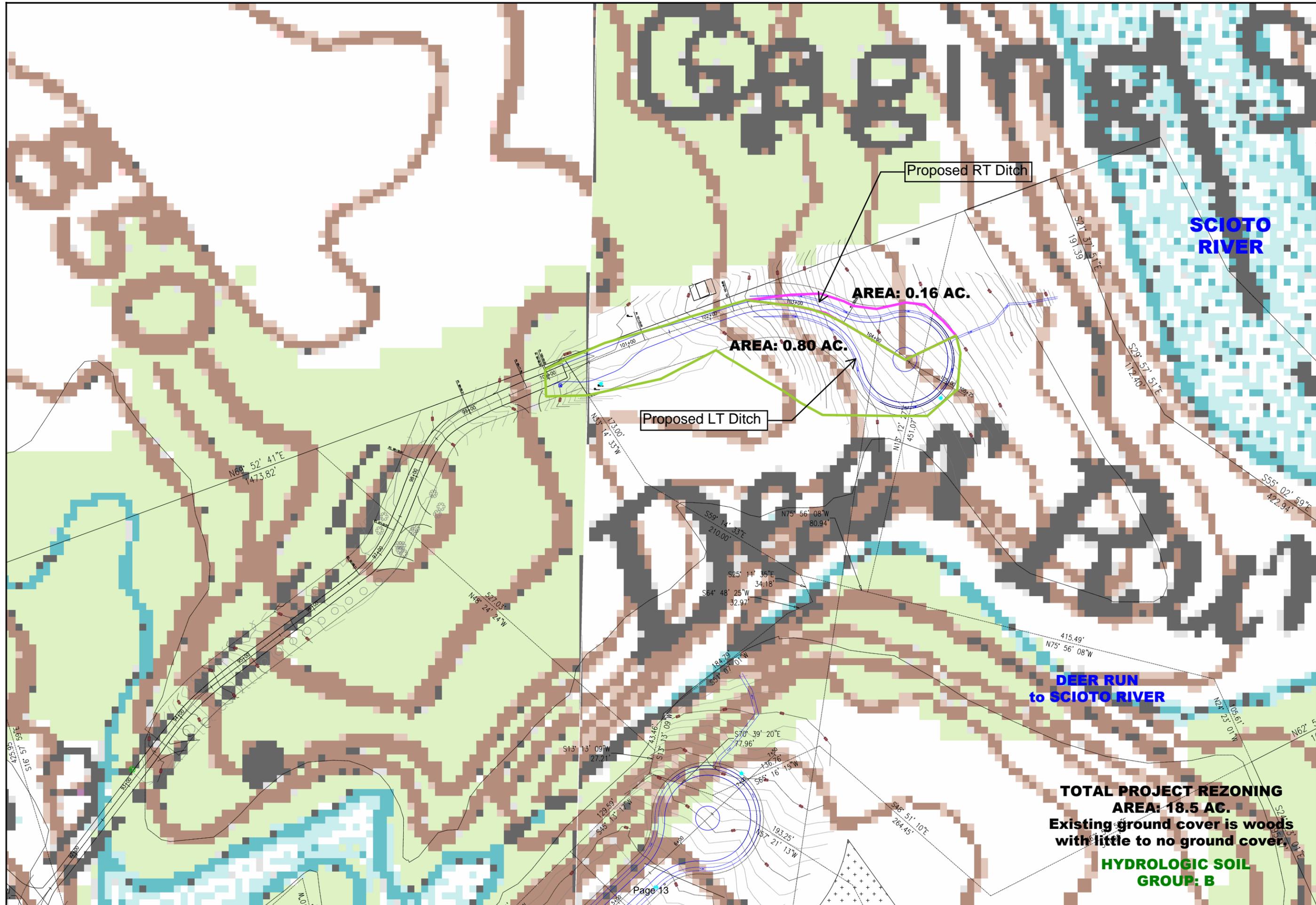
The project is a new construction project so water quality treatment is required for a 0.75 inch event. Quantity treatment is not required since the project location is located within the River Corridor. The project % of increase in impervious area for Subarea A is 1.78%, while for Subarea B it is 3.01%. By utilizing Vegetated Bioretention Swale within the proposed ditches, with a 12" soil layer under the finished grade of the ditch bottom, we are able to treat the required 0.75 inch event for the project.

IV. Drainage Area Maps



DRAINAGE MAP
SUBAREA A

DEER RUN

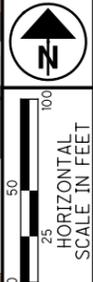


SCIOTO RIVER

DEER RUN
to SCIOTO RIVER

**TOTAL PROJECT REZONING
AREA: 18.5 AC.
Existing ground cover is woods
with little to no ground cover.**

**HYDROLOGIC SOIL
GROUP: B**



**DRAINAGE MAP
SUBAREA B**

DEER RUN

**DEER RUN
to SCIOTO RIVER**

Proposed LT Ditch #2

AREA: 0.34 AC.

Proposed LT Ditch #1

AREA: 0.79 AC.

Proposed RT Ditch #2

AREA: 0.15 AC.

AREA: 0.68 AC.

Proposed RT Ditch #1

12" - B w/catch
basin inlet

**TOTAL PROJECT REZONING
AREA: 16.1 AC.
Existing ground cover is woods
with ground cover.**

**HYDROLOGIC SOIL
GROUP: D**