

Memorandum

To: Kevin Lord, P.E.
Village of Cottage Grove

Date: 9/24/2020

From: Brian Arcand

CC:

RE: Cottage Grove Commons – Phase 2

The intent of this memo to accompany the GDP submittal is to receive guidance from the Village to verify requirements and assumptions. Infiltration test pits are scheduled to occur and in the mean time, an infiltration rate of 0.50 in/hr was assumed, which is the worst case scenario that would still require full infiltration requirements be met. Test pit results will be provided as soon as they are available.

It is acknowledged that the wet pond, as shown, has minimal to no freeboard and the grading area around the pond will be adjusted as the intent of the stormwater management plan is agreed upon by the Village. The intent of the stormwater management would be to pipe the 100-year storm event to the proposed facilities. An emergency overflow route (not utilized up to, and including, the 100-year event) would be located at the low point in N. Windsor Ave. going west to the west property line and south to the outlet.

The wet pond as approved in Phase 1 will not be modified and will collect runoff from the additional two 8-unit buildings and a portion of N. Windsor Ave. as shown in the approved stormwater report for Phase 1. This wet pond will be further utilized to collect a small portion of runoff from Phase 2, which will result in some runoff to the south from the Phase 1 pond in the 100-year event. This runoff would be routed through the storm sewer to the Phase 2 stormwater facilities.

Enclosures include:

- Hydrologic Soil Map
- FIRM Map
- WDNR Surface Water Data Viewer Map
- Pre-Development Drainage Map
- Post-Development Drainage Map
- Pre-Development Hydrology Model

- Post-Development Hydrology Model
- Pre-Development WinSLAMM Model
- Post-Development WinSLAMM TSS Model
- Post-Development WinSLAMM Infiltration Model (with calculations)

Stormwater Requirements Cottage Grove Commons Phase 2:

- Rate Control:
 - 1-year, 24-hour storm event
 - 2-year, 24-hour storm event
 - 10-year, 24-hour storm event
 - 100-year, 24-hour storm event (and safely pass)
- Total Suspended Solids (TSS):
 - Reduce, to the maximum extent practicable, TSS loads leaving the site by eighty percent (80%)
- Phosphorus Reduction
 - Reduce by 54%
- Infiltration:
 - Post-development infiltration volume shall be at least ninety percent (90%) of the pre-development infiltration volume, based on an average annual rainfall

Rate Control was analyzed based on the entire project area (Phase 1 and 2 combined):

	Pre-Development – North (cfs)	Pre-Development – South (cfs)	Pre-Development – Overall (cfs)
1-Year	3.92	8.64	12.53
2-Year	4.88	12.29	17.14
10-Year	9.48	27.98	36.87
100-Year	21.27	66.81	80.92

	Post-Development – North (cfs)	Post-Development – South (cfs)	Post-Development – Overall (cfs)
1-Year	1.65	3.32	4.97
2-Year	2.44	3.93	5.80
10-Year	7.50	27.85	34.41
100-Year	14.33	66.45	79.87

TSS was analyzed based on the entire project area (Phase 1 and 2 combined):

	Particulate Solids Yield (lbs.)	Percent Particulate Solids Reduction
Total of All Land Uses without Controls	4650	
Outfall Total with Controls	923.8	80.13
Annualized Total After Outfall Controls	926.3	

Phosphorus was analyzed based on the entire project area (Phase 1 and 2 combined):

	Concentration – No Controls	Concentration – With Controls	Concentration Units	Pollutant Yield – No Controls	Pollutant Yield – With Controls	Pollutant Yield Units	Percent Yield Reduction
Particulate Phosphorus	0.1979	0.07013	Mg/L	12.46	2.600	Lbs	79.12
Filterable Phosphorus	0.1022	0.1046	Mg/L	6.436	3.877	Lbs	39.76
Total Phosphorus	0.3001	0.1747	Mg/L	18.89	6.478	Lbs	65.71

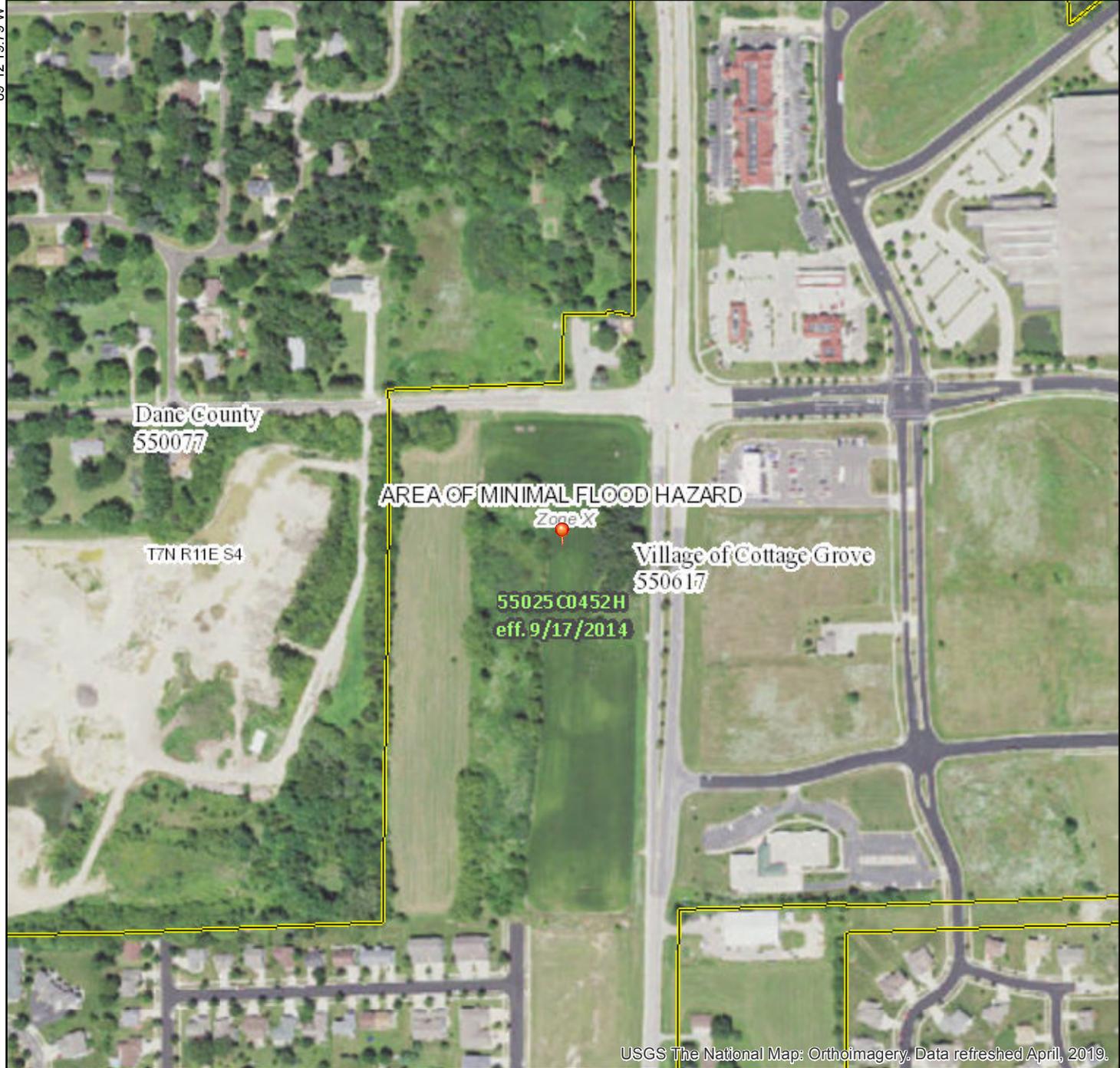
Infiltration for Phase 2 was analyzed separately from Phase 1 due to the fact that Phase 1 received a partial exemption on infiltration from the DNR and the Village:

Condition	Runoff Volume (cu. ft.)	Percent Infiltrated
Pre-Development	63,506	
Post-Development	153,919	90.9

National Flood Hazard Layer FIRMette



43°6'27.83"N



USGS The National Map: Orthoimagery, Data refreshed April, 2019. 1:6,000 43°6'1.56"N

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D

OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall

OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature

MAP PANELS		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 8/8/2019 at 1:49:53 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, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.





Surface Water Data Viewer Map



Legend

- Wetland Identifications and Confirmations
- Wetland Class Points**
 - Dammed pond
 - Excavated pond
 - Filled excavated pond
 - Filled/draind wetland
 - Wetland too small to delineate
- Filled Points
- Wetland Class Areas**
 - Wetland
 - Upland
- Filled Areas
- Wetland Class Points**
 - Dammed pond
 - Excavated pond
 - Filled excavated pond
 - Filled/draind wetland
 - Wetland too small to delineate
- Filled Points
- Wetland Class Areas**
 - Wetland
 - Upland
- Filled Areas
- NRCS Wetspots
- Maximum Extent Wetland Indicators
- Municipality
- State Boundaries
- County Boundaries
- Major Roads**
 - Interstate Highway
 - State Highway
 - US Highway
- County and Local Roads**

Notes

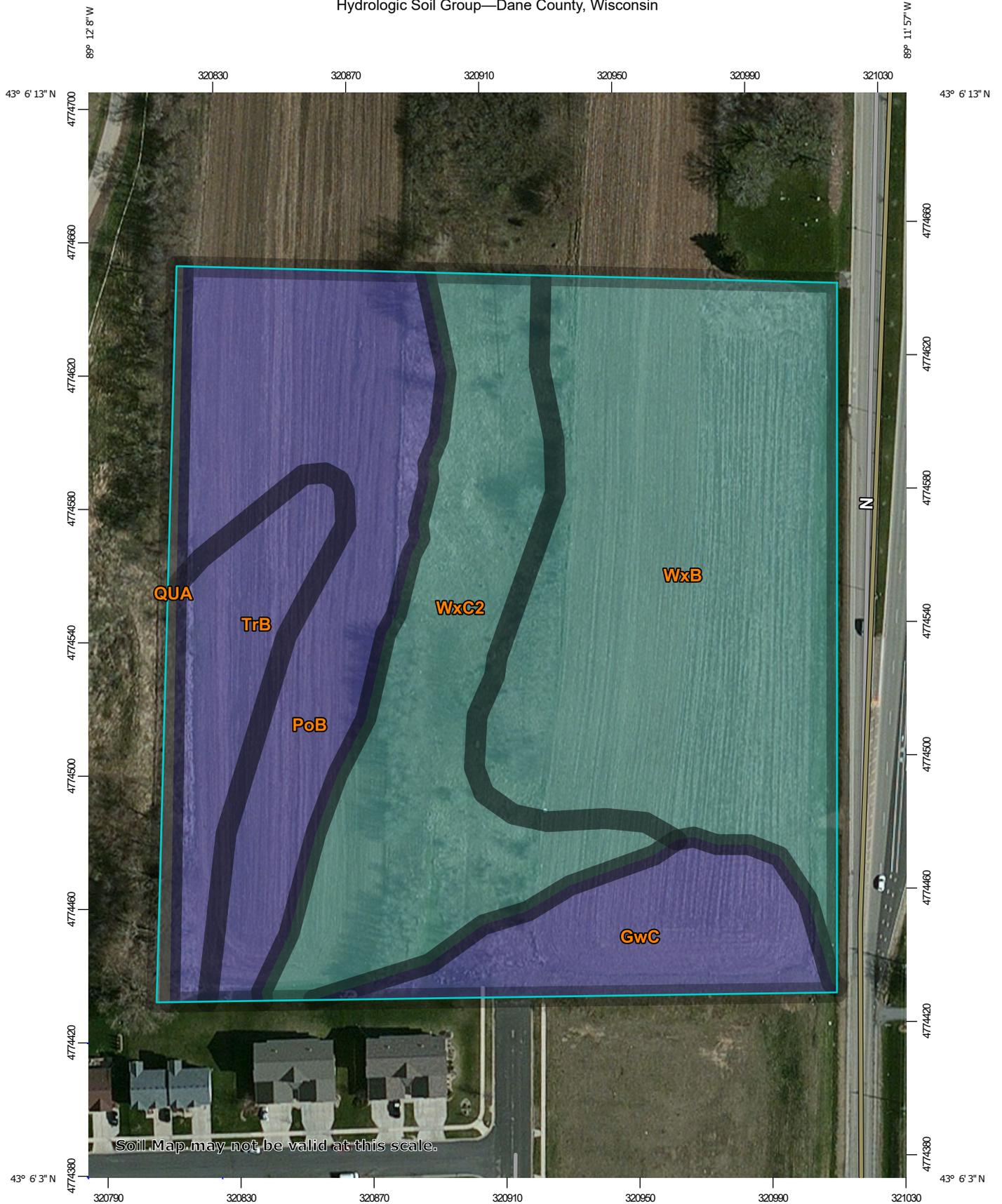
0.1 0 0.06 0.1 Miles

NAD_1983_HARN_Wisconsin_TM

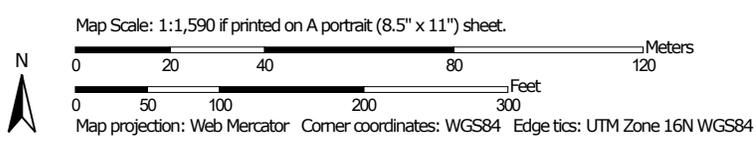
1: 3,960

DISCLAIMER: The information shown on these maps has been obtained from various sources, and are of varying age, reliability and resolution. These maps are not intended to be used for navigation, nor are these maps an authoritative source of information about legal land ownership or public access. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or legality of the information depicted on this map. For more information, see the DNR Legal Notices web page: <http://dnr.wi.gov/legal/>

Hydrologic Soil Group—Dane County, Wisconsin



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

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: Dane County, Wisconsin
 Survey Area Data: Version 19, Jun 8, 2020

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
GwC	Griswold loam, 6 to 12 percent slopes	B	1.0	9.6%
PoB	Plano silt loam, gravelly substratum, 2 to 6 percent slopes	B	2.3	21.6%
QUA	Quarry		0.2	1.4%
TrB	Troxel silt loam, 0 to 3 percent slopes	B	0.9	8.5%
WxB	Whalan silt loam, 2 to 6 percent slopes	C	4.0	36.9%
WxC2	Whalan silt loam, 6 to 12 percent slopes, eroded	C	2.4	22.0%
Totals for Area of Interest			10.8	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.

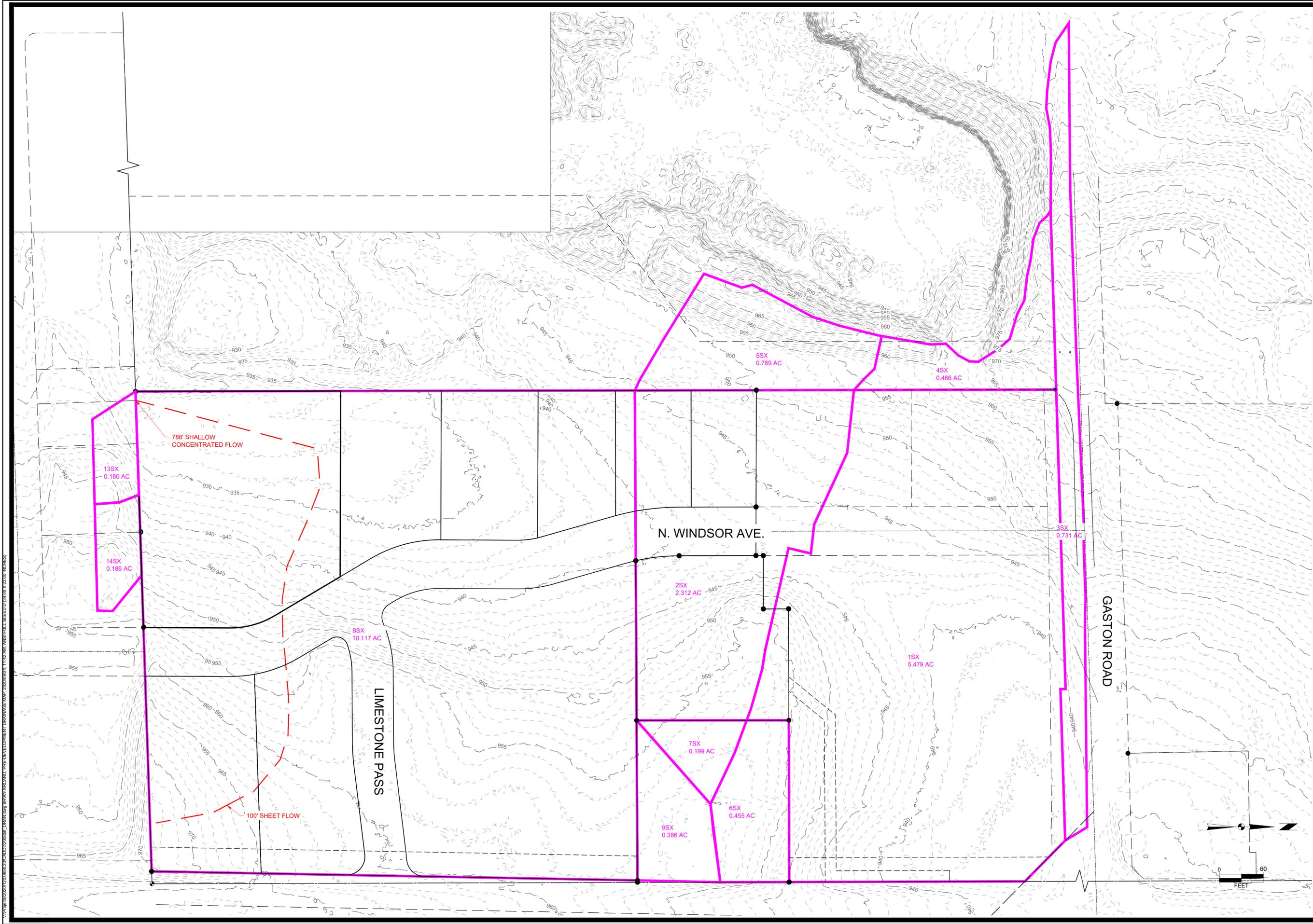
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



1:00 PAPER SIZE: 24" X 36" (600 X 900) PLOT SCALE: 1" = 100' (1:12000) DATE: 09/24/2020 PROJECT: COTTAGE GROVE COMMONS - PHASE 2

MARK	REVISION	DATE	BY
Engineer:BCA	Checked By: MLC	Scale: 1" =	
Technician:TECH	Date: 09-24-2020	T-R-S: TTN-RRW-SS	

Project No: 120.0856.30

COTTAGE GROVE COMMONS - PHASE 2
 PRE-DEVELOPMENT DRAINAGE MAP VILLAGE OF COTTAGE GROVE, DANE COUNTY, WI
SNYDER & ASSOCIATES, INC.

2727 S.W. SNYDER BLVD
 ANKENY, IOWA 50023
 515-964-2020 | www.snyder-associates.com



SNYDER & ASSOCIATES

Project No: 120.0856.30
 Sheet EXBT

Model Assumptions

Notes:

1. WinSLAMM model is based on the post-development HydroCAD model for the proposed project site along with the assumptions stated below.

Assumptions:

1. Infiltration calculations only include the 10.117 acres for Phase 2.
2. TSS calculations include the entire 21.32 acres for Phase 1 and Phase 2.
3. Pre-development WinSLAMM model assumes normal silty soil.
4. Post-development WinSLAMM model assumes normal clayey soil for any disturbed areas to account for compaction during construction.
5. Post-development HydroCAD model lowers permeable areas by one permeability class to account for compaction during construction.
6. Off-site drainage areas 13SX and 14SX were assumed to be 1/3 acre lots in HydroCAD and Medium Density Residential No Alleys in WinSLAMM.





Infiltration Calculations

Average Annual Rainfall = 28.81 inches

Notes:

- 1.) Infiltration calculations are based on runoff volume outputs from WinSLAMM v10.2.1
- 2.) [Redacted] = Cells That Require Data Input.

Pre-Development Infiltration Calculations:

1.) Pre-development Project Site Area = 10.117 acres

$$10.117 \text{ acres} * (43,560 \text{ sq. ft./1 acre}) = 440,697 \text{ sq. ft.}$$

2.) Pre-development runoff volume = 63,506 cu. ft.

3.) Pre-development runoff depth = (63,506 cu. ft. / 440,697 sq. ft.)

$$= 0.14 \text{ ft.}$$

$$= 1.73 \text{ in.}$$

4.) Pre-development stay-on depth = (28.81 in. - 1.73 in.)

$$= 27.08 \text{ in}$$

Target Post-Development Stay-On Depth = 90.0% of Pre-Development Stay-On Depth

5.) Target Post-development stay-on = (27.08 in. * 0.9)

$$= 24.37 \text{ in.}$$

Post-Development Infiltration Calculations:

1.) Post-development Project Site Area = 10.117 acres

$$10.117 \text{ acres} * (43,560 \text{ sq. ft./1 acre}) = 440,697 \text{ sq. ft.}$$

2.) Post-development runoff volume = 153,919 cu. ft.

3.) Post-development runoff depth = (153,919 cu. ft. / 440,697 sq. ft.)

$$= 0.35 \text{ ft.}$$

$$= 4.19 \text{ in.}$$



Post-Development Infiltration Calculations (Continued):

4.) Post-development stay-on depth = (28.81 in. - 4.19 in.)

$$= \quad \mathbf{24.62 \text{ in}}$$

5.) Post-development stay-on percentage as compared to pre-development stay-on:

$$= (24.62 \text{ in.} / 27.08 \text{ in.})$$

$$= \quad \mathbf{90.9\%}$$

The post-development project site infiltrates approximately **90.9%** of the pre-development infiltration volume.