Project Information	
Project EDA	3.0 acres
Aix: Existing Impervious Area	3.0 acres
Ain: New Impervious Area	0.0 acres
T%: Treatment Percent	20%
Area 1 - Drainage Area to Ditches	4.0 acres
Area 2 - Drainage Area to Ditches	2.1 acres
Area 3 - Drainage Area to Ditches	0.6 acres
Area 1 - R/W Draining to Ditches	1.1 acres
Area 2 - R/W Draining to Ditches	1.3 acres
Area 3 - R/W Draining to Ditches	0.2 acres

Drainage Area to Ditch

ODOT R/W Portion of Drainage Area

Project Earth Distrubed Area (EDA)

BMP Design Approach

Provide 100% treatment of T% of the Project EDA.
The treatment goal is 20% X 3.0 acres = 0.6 acres.

The northeast corner of the project EDA sheet flows outside ODOT R/W. No treatment is required in this area.
New treatment goal = (Project EDA - Sheet flow) x T%
(3.0 acres - 0.16 acres) x 20% = 0.57 acres

While Area 3 has a contributing drainage area of 0.6 acres, the ODOT component is only 0.2 acres. Therefore, only 0.2 acres would count towards treatment.

Area 1 has a drainage area of 4 acres, and ODOT contribution of 1.1 acres. This would satisfy the requirements of 0.57 acres of treatment.

Area 2 has a drainage area of 2.1 acres, and ODOT contribution of 1.3 acres. This would satisfy the requirements of 0.57 acres of treatment.

Area 1 or 2 may be acceptable locations for a vegetated biofilter. Determine the water quality flow (WQF), in order to size the vegetated biofilters. The depth may not exceed 4 in and the velocity may not exceet 1 fps during the WQF.

Area 1
Runoff Coefficient: 1.1 acres paved with RC=0.9,
2.9 acres woods with RC=0.3
Weighted RC=0.465
WQF=CiA,
WQF=(0.465 X 0.65 in/hr X 4.0 acres)
WQF=1.209 cfs

Area 2
Runoff Coefficient: 1.3 acres paved with RC=0.9,
0.8 acres woods with RC=0.3
Weighted RC=0.67
WQF=CiA,
WQF=(0.67 X 0.65 in/hr X 2.1 acres)
WQF=0.915 cfs

Using Manning's Equation, determine a trapezoidal channel that passes the WQF with the depth less than or equal to 4 in and the velocity less than or equal to 1 fps.

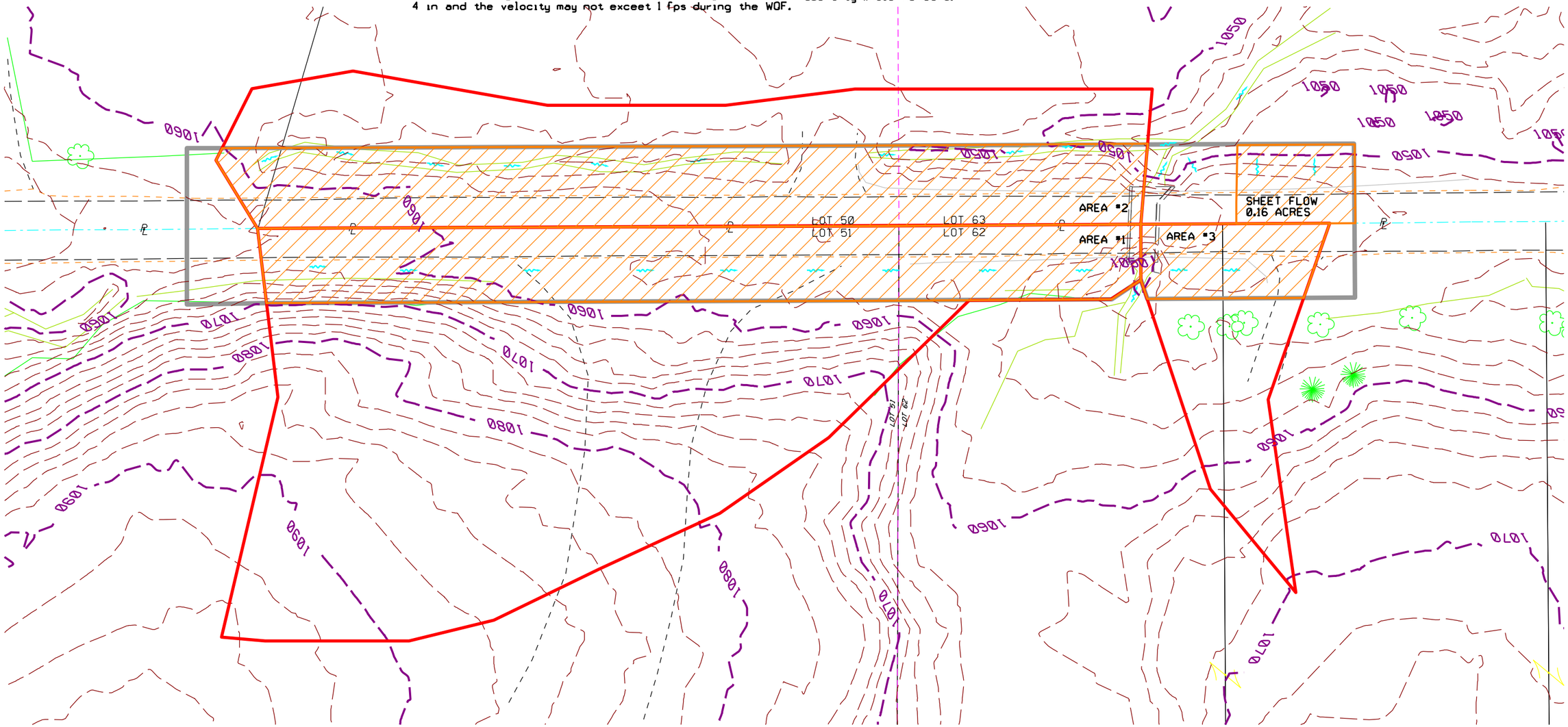
When selecting potential channel bottom widths, use only whole numbers.

Area 1: Assume a possible channel geometry.
Fore slope=2:1, Back slope=2:1, Longitudianl slope=0.01 ft/ft, Manning's roughness coefficient=0.15. Use trial and error to determine the smallest channel bottom width that will meet the depth and velocity requirements. A channel bottom width of 8 ft results in a depth of 3.83 in and a velocity of 0.44 fps at a flow rate of 1.209 cfs.

Area 2: Assume a possible channel geometry.
Fore slope=2:1, Back slope=2:1, Longitudianl slope=0.01 ft/ft, Manning's roughness coefficient=0.15. Use trial and error to determine the smallest channel bottom width that will meet the depth and velocity requirements. A channel bottom width of 6 ft results in a depth of 3.84 in and a velocity of 0.43 fps at a flow rate of 0.915 cfs.

The utility and right-of-way impacts should be evaluated and factored into the decision between choosing Area 1 or Area 2.

Smaller vegetated biofilters are possible if drainage areas are divided futher to treat only the 0.57 acre area within the R/W required for this project.



CALCULATED
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VEGETATED BIOFILTER EXAMPLE

BMP - JAN. 2015

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Project Information	
Project EDA	3.0 acres
Aix: Existing Impervious Area	3.0 acres
Ain: New Impervious Area	0.0 acres
T%: Treatment Percent	20%
Area 2 - Drainage Area to Ditches	2.1 acres
Area 2a - Drainage Area to Ditches	0.97 acres
Area 2 - R/W Draining to Ditches	1.3 acres
Area 2a - R/W Draining to Ditches	0.57 acres

Drainage Area to Ditch

ODOT R/W Portion of Drainage Area

Project Earth Distrubed Area (EDA)

BMP Design Approach

The treatment goal for the project is 0.57 acres within ODOT R/W.

The area draining to the potential vegetated biofilter location in Area 2 is smaller than Area 1. Therefore, optimize the vegetated biofilter in Area 2 based on the treatment goal

Delineate a new, smaller drainage basin on the upstream portion of Area 2 such that it includes 0.57 acres of area within ODOT R/W. Call that Area 2a.

By subdelineating Area 2 into a smaller, upstream Area 2a, the tributary drainage area is reduced to 0.97 acres with 0.57 acres within ODOT R/W.

Area 2a
Runoff Coefficient: 0.57 acres paved with RC=0.9, 0.40 acres woods with RC=0.3
Weighted RC=0.653
WQF=CiA,
WQF=(0.653 X 0.65 in/hr X 0.97 acres)
WQF=0.412 cfs

Using Manning's Equation, determine a trapezoidal channel that passes the WQF with the depth less than or equal to 4 in and the velocity less than or equal to 1 fps.

When selecting potential channel bottom widths, use only whole numbers.

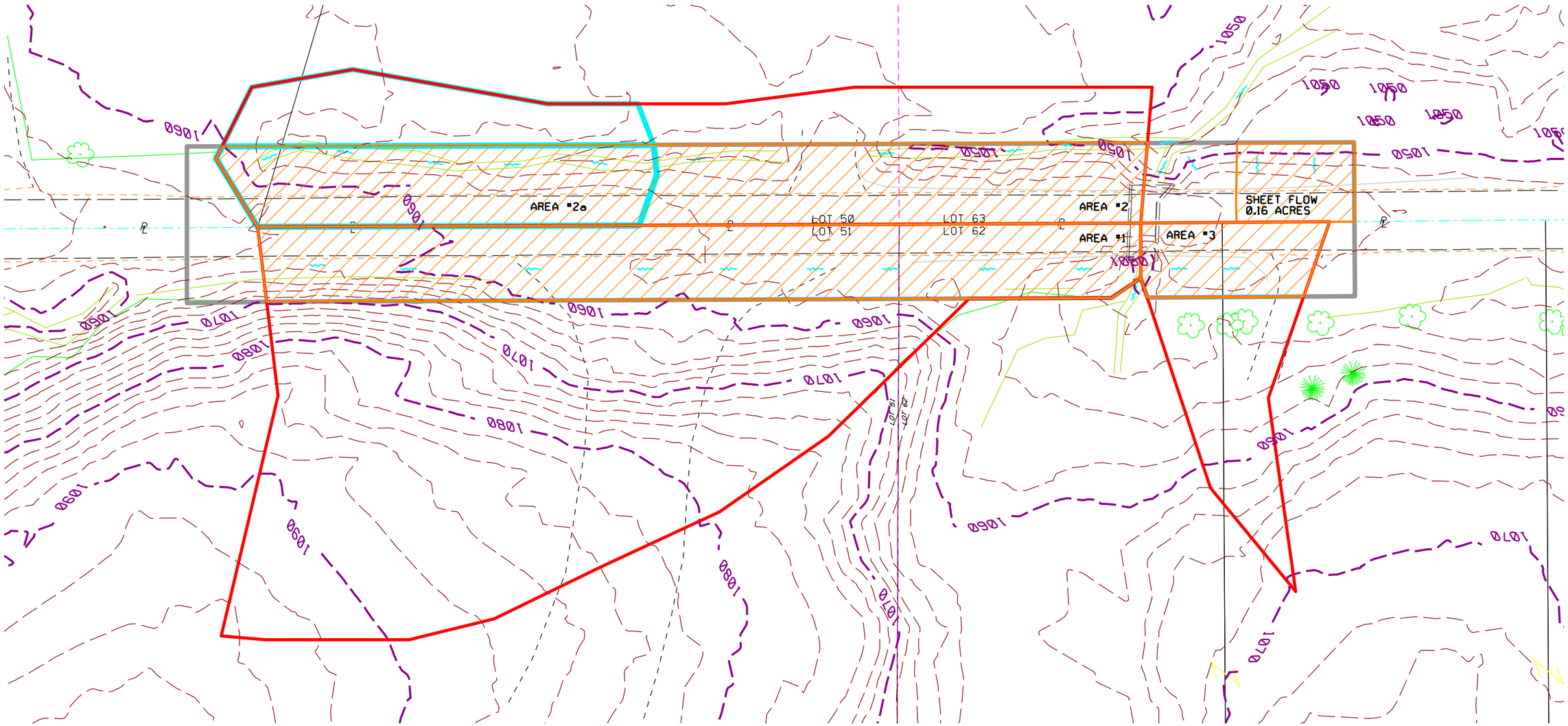
Area 2a: Assume a possible channel geometry. Fore slope=2:1, Back slope=2:1, Longitudianl slope=0.01 ft/ft, Manning's roughness coefficient=0.15. Use trial and error to determine the smallest channel bottom width that will meet the depth and velocity requirements. A channel bottom width of 3 ft results in a depth of 3.54 in and a velocity of 0.39 fps at a flow rate of 0.412 cfs.

The minimum allowable bottom width for a vegetated biofilter is 4 ft. Since only a 3 ft width is needed to meet depth and velocity requirements, use a bottom width of 4 ft.

A channel bottom width of 4 ft results in a depth of 3.02 in and a velocity of 0.36 fps at a flow rate of 0.412 cfs for the channel geometry above.

Add 6 in of Item 659, Topsoil, to the vegetated portion of the shoulder and foreslope of the Vegetated Biofilter.

Add Item 670, Ditch Erosion Protection, to the plans when using Vegetated Biofilter.



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VEGETATED BIOFILTER EXAMPLE

BMP - JAN. 2015

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