# ODOT Design Updates from Ohio EPA's Updated CGP

# Construction General Permit

- Updated April 23, 2018
- Grandfathering and NOI resubmittal
- SWPPP Documentation and Preparation
- Erosion and Sediment Control Updates
- Post-Construction BMP Updates

# Grandfathering

- **180 days to submit renewal NOI**
- **October 20, 2018**
- **180 days to update SWPPP for new requirements**

  No post-construction BMP changes if:
  - Original NOI before April 23, 2018
  - SWPPP approved locally before April 23, 2018 and will start construction by October 20, 2018
- **If no NOI by Oct. 20, 2018, then coverage terminated**

# Ohio EPA CGP vs. ODOT L&D Vol.2

- **Permit:**

  The construction of new roads and roadway improvement projects by public entities (i.e. the state, counties, townships, cities, or villages) may implement post-construction BMPs in compliance with the current version (as of the effective date of this permit) of the Ohio Department of Transportation's "Location and Design Manual, Volume Two Drainage Design" that has been accepted by Ohio EPA as an alternative to the conditions of this permit.

# Ohio EPA CGP vs. ODOT L&D Vol.2

- ODOT's L&D Vol. 2:  alternative to post-construction BMP requirements
- L&D post-construction BMP guidance reviewed by Ohio EPA
- Conformance with ODOT's L&D a condition of funding from FHWA

# Grandfathering

**Roadway Projects:**

- **Post-Construction BMPs from L&D**
- **L&D updated January 18, 2019**
- **Projects that have submitted Stage 2 or finalized R/W acquisition will be grandfathered**
- **Others will have to update post-construction BMPs**

# Construction General Permit

- Updated April 23, 2018
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# SWPPP Documentation and Preparation

- **NOI, NOT, Co-Permittee NOI/NOT submitted electronically**
- **New SWPPP requirements:**
  - Description of on-site streams (channelization, bed instability, headcuts, etc.)
  - No longer need a copy of the permit
  - Floodplain fill, excavation, or stream crossings

# SWPPP Documentation and Preparation

- Roadway Projects:  Contractor can still prepare SWPPPs after NOI
- SWPPPs must be completed before disturbance

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# Sediment Basins / Traps – 2013

**Sediment settling ponds required for:**

- Concentrated or collected storm water (storm sewer or ditch)
- Runoff from areas which exceed the design capacity of silt fence or sediment barriers
- Runoff from drainage area that exceed the design capacity of inlet protection
- Runoff from common drainage locations with 10 or more acres of disturbed land

# Sediment Basins / Traps – 2018

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- Runoff from drainage area that exceed the design capacity of inlet protection
- ~~Runoff from common drainage locations with 10 or more acres of disturbed land~~

# Sediment Barriers

**Table 3 Sediment Barrier Maximum Drainage Area Based on Slope**

| Maximum drainage area (in acres) to 100 linear feet of sediment barrier | Range of slope for a particular drainage area (in percent) |
|---|---|
| 0.5 | < 2% |
| 0.25 | ≥ 2% but < 20% |
| 0.125 | ≥ 20% but < 50% |

- "For most applications, standard silt fence may be substituted with a 12-inch diameter sediment barrier."
- No definition of "sediment barrier" in permit
- RW&LD manual defines filter socks as having compost with well-decomposed organic matter
- Permit appears to allow 12" straw wattles…

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# Post-Construction BMP Updates

- Small Construction vs. Construction
- Redevelopment
- Water Quality Volume ($WQ_V$)
- Retention Basin
- Water Quality Flow ($WQ_F$)
- Routine Maintenance

# Preliminary BMP Calculations

- Tributary Area
- Treatment Credit
- Runoff Coefficient
- Water Quality Volume ($WQ_V$)
- Water Quality Flow ($WQ_F$)

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- Tributary Area
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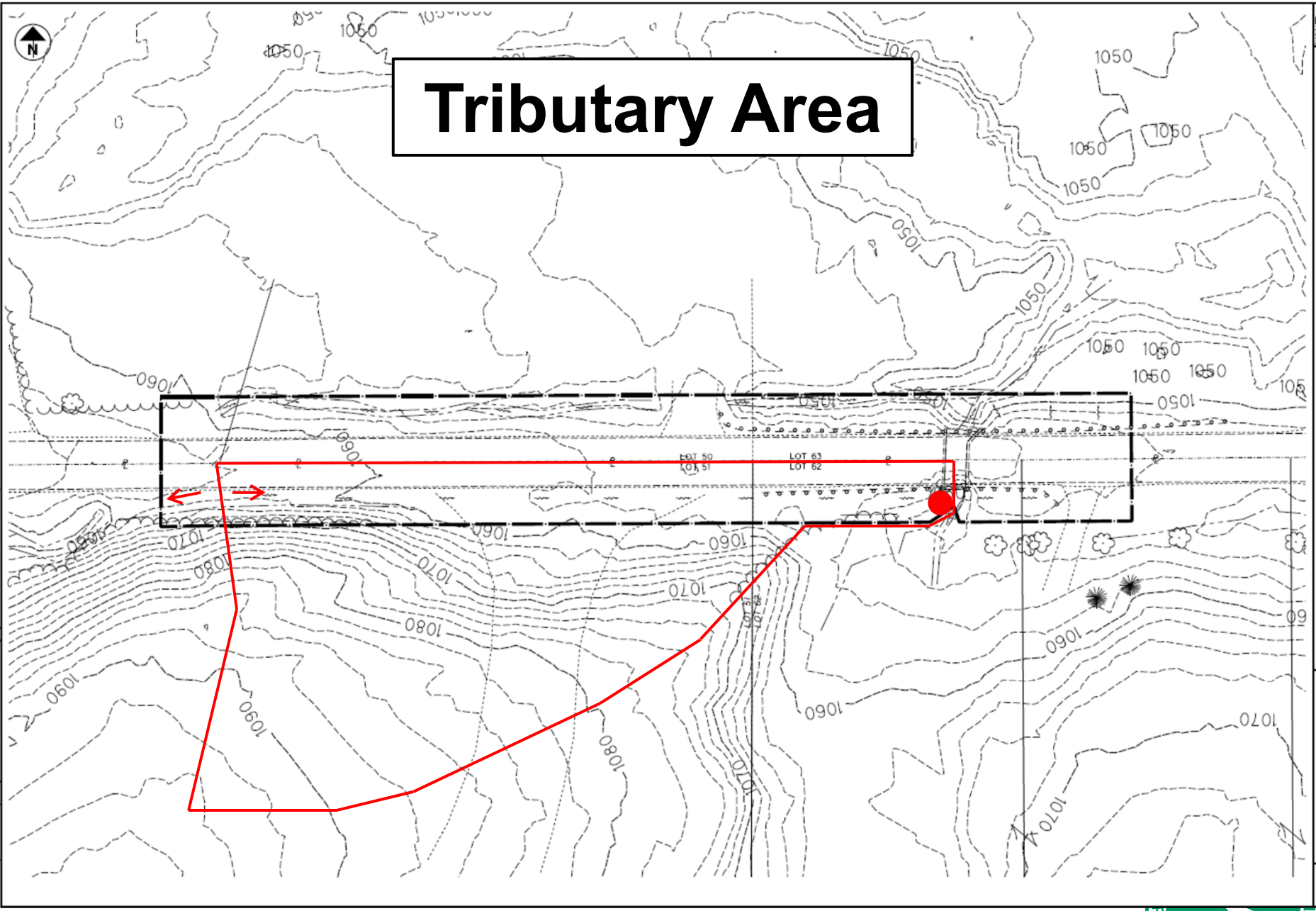
# Tributary Area

- Draw drainage basin boundary perpendicular to contours
- Look for conveyance (pipes, ditches, etc.)
- Look for drainage divides

- Example:

# Tributary Area



# Preliminary BMP Calculations

- Tributary Area
- Treatment Credit
- Runoff Coefficient
- Water Quality Volume ($WQ_V$)
- Water Quality Flow ($WQ_F$)

# Treatment Credit

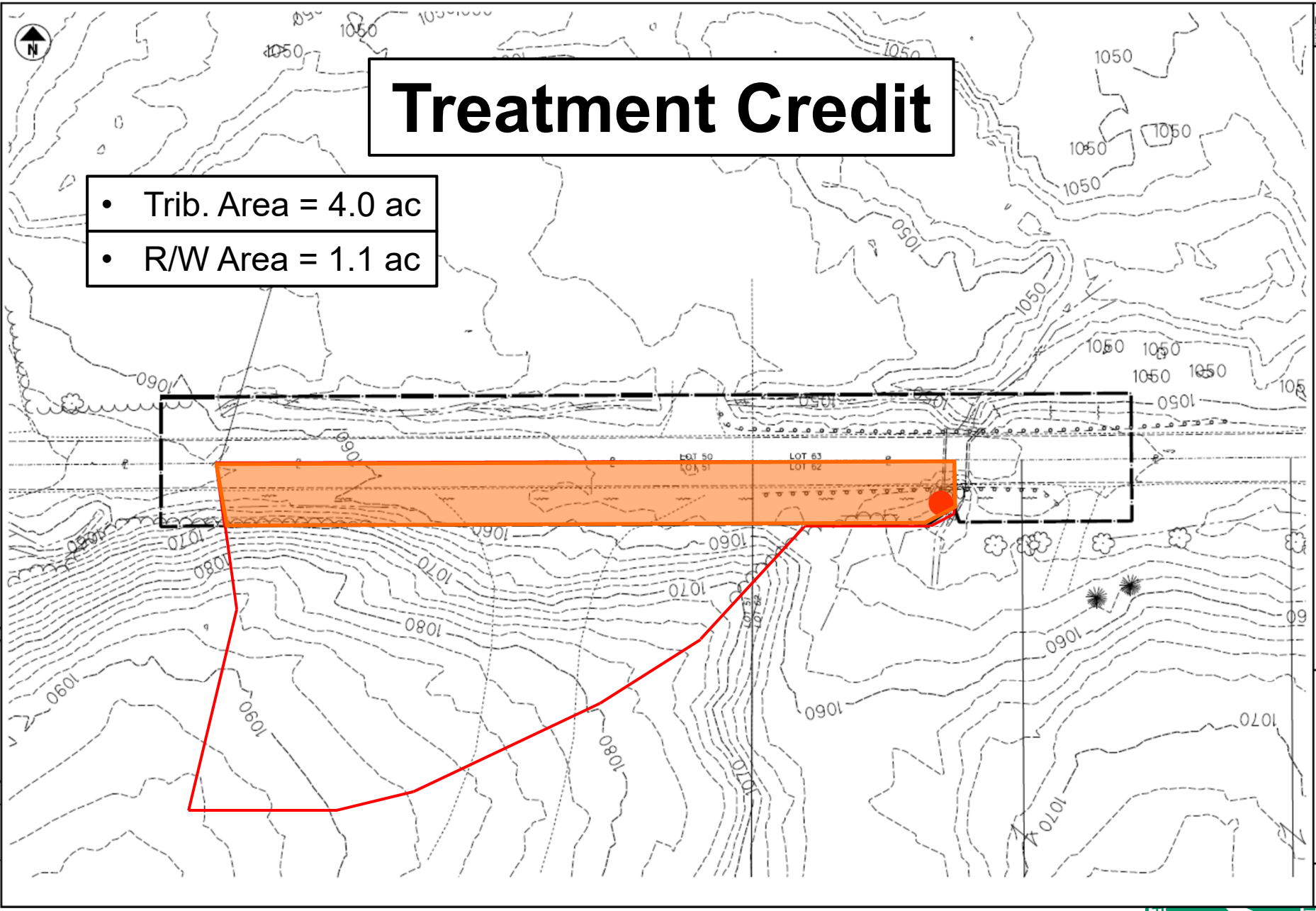
- Required Treatment = Project EDA * T%

- Treatment credit only for area within right-of-way
- Credit given to all right-of-way area, not just disturbed area
- BMPs must be sized for all tributary area

- BMPs sized based on area, volume, or flow rate, but credit is based on how much right-of-way drains to an appropriately sized BMP.
- Example:

# Treatment Credit

- Trib. Area = 4.0 ac
- R/W Area = 1.1 ac



# Preliminary BMP Calculations

- Tributary Area
- Treatment Credit
- Runoff Coefficient
- Water Quality Volume ($WQ_V$)
- Water Quality Flow ($WQ_F$)

# Runoff Coefficient

- **Depends on what you're calculating**
  - Flow rate – Rational Method; coefficient of runoff
  - Water Quality Volume – Volumetric runoff coefficient
  - Sound alike, but not the same

- **Rational Method**
  - Q = CiA
  - Calculate weighted coefficient

# Runoff Coefficient

- **Depends on what you're calculating**
  - Flow rate – Rational Method; coefficient of runoff
  - Water Quality Volume – Volumetric runoff coefficient
  - Sound alike, but not the same

- **<u>NEW – January 2019</u>: Water Quality Volume ($WQ_V$)**
  - $WQ_V = (P*A*R_V)/12$
  - $R_V$ = Runoff coefficient
  - $R_V = 0.05 + 0.9*i$
  - i = impervious area divided by the total area

# Runoff Coefficient

- Examples:

- Determine the Rational Method coefficient of runoff (C) for $WQ_F$ for BMP sizing
- Determine the Rational Method coefficient of runoff (C) for culvert sizing
- <u>NEW – January 2019</u>: Determine the runoff coefficient ($R_V$) for $WQ_V$ for BMP sizing

# Runoff Coefficient

- ODOT L&D Vol. 2, Section 1115.6.1

"While all areas within ODOT right-of-way may not be covered by impervious surfaces, the area within existing ODOT right-of-way is considered impervious for the purpose of post-construction BMP design considerations. Therefore, consider all area within existing right-of-way to be impervious when performing post-construction BMP calculations."

# Coefficient of Runoff – $WQ_F$ BMP

- Right-of-Way = 1.1 ac; C = 0.9
- Woods = 2.9 ac; C = 0.3
- Weighted C = [(1.1*0.9)+(2.9*0.3)] / (1.1+2.9) = 0.465

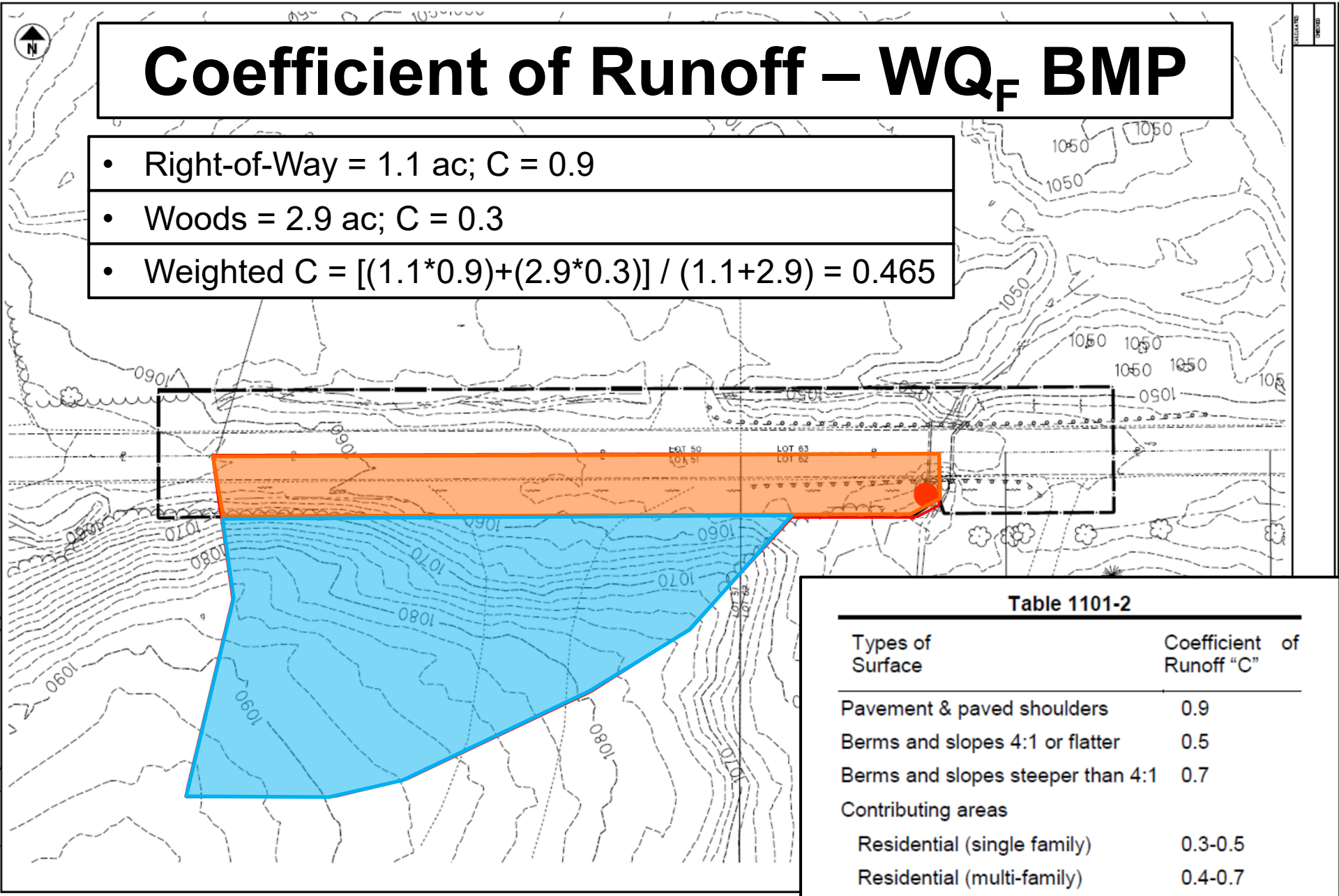
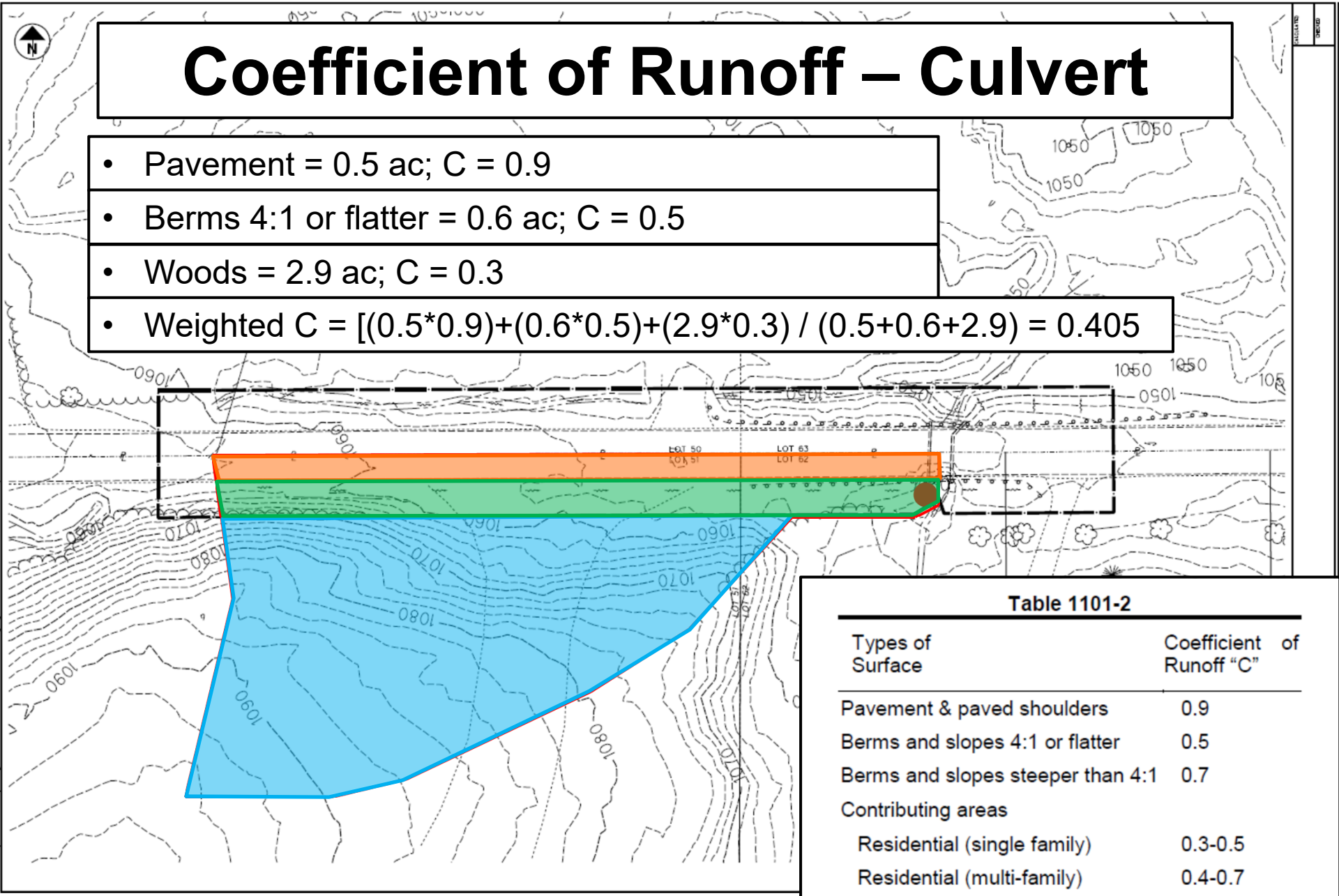



**Table 1101-2**

| Types of Surface | Coefficient of Runoff "C" |
|---|---|
| Pavement & paved shoulders | 0.9 |
| Berms and slopes 4:1 or flatter | 0.5 |
| Berms and slopes steeper than 4:1 | 0.7 |
| Contributing areas | |
| Residential (single family) | 0.3-0.5 |
| Residential (multi-family) | 0.4-0.7 |
| Woods | 0.3 |
| Cultivated | 0.3-0.6 |

# Coefficient of Runoff – Culvert

- Pavement = 0.5 ac; C = 0.9
- Berms 4:1 or flatter = 0.6 ac; C = 0.5
- Woods = 2.9 ac; C = 0.3
- Weighted C = [(0.5*0.9)+(0.6*0.5)+(2.9*0.3) / (0.5+0.6+2.9) = 0.405

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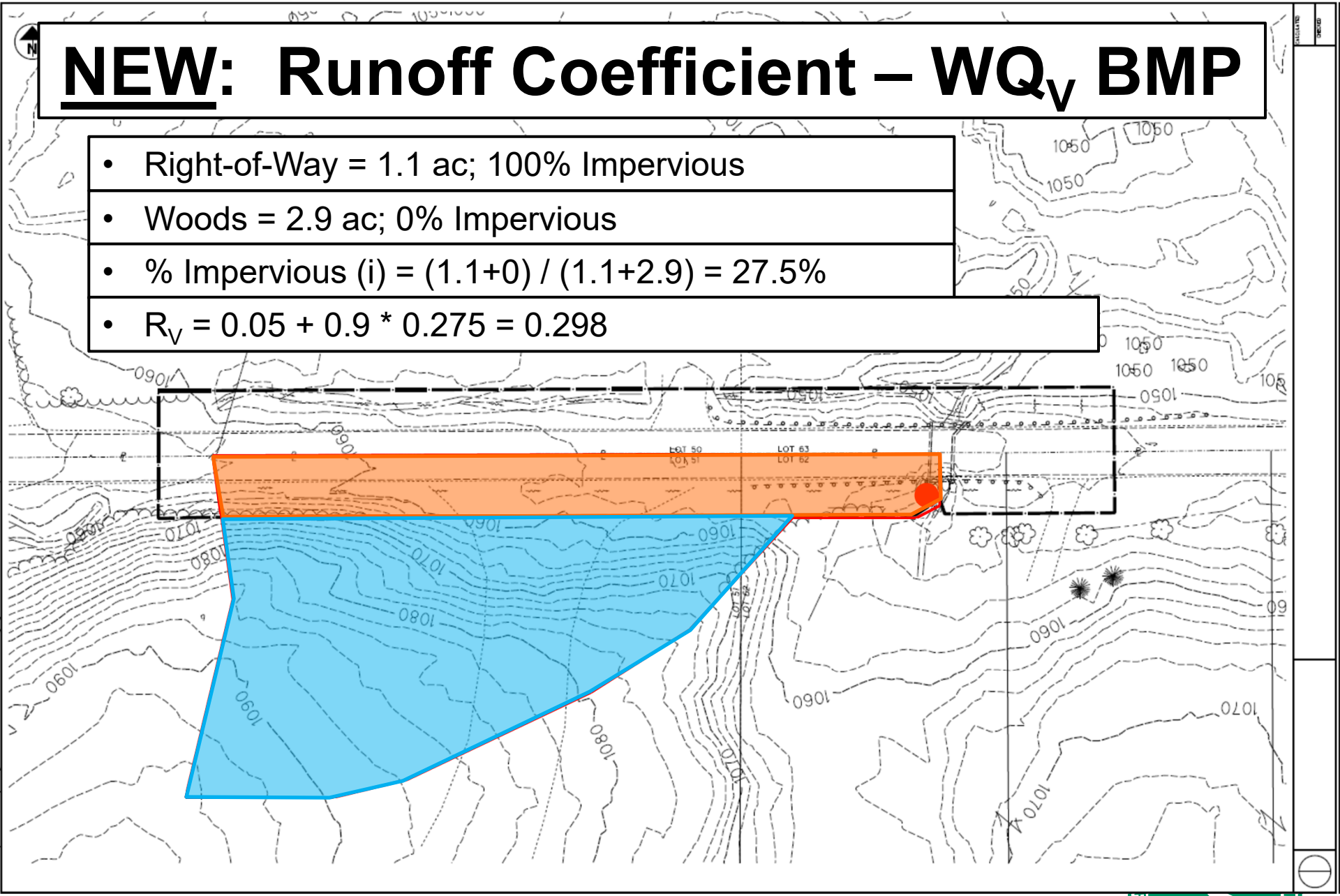
| Residential (multi-family) | 0.4-0.7 |
| Woods | 0.3 |
| Cultivated | 0.3-0.6 |

# NEW: Runoff Coefficient – $WQ_V$ BMP

- Right-of-Way = 1.1 ac; 100% Impervious
- Woods = 2.9 ac; 0% Impervious
- % Impervious (i) = (1.1+0) / (1.1+2.9) = 27.5%
- $R_V = 0.05 + 0.9 * 0.275 = 0.298$



# Runoff Coefficient

- Examples:

- C for $WQ_F$ for BMP sizing = 0.465
- C for culvert sizing = 0.405
- <u>NEW – January 2019</u>: $R_V$ for $WQ_V$ for BMP sizing = 0.298

# Preliminary BMP Calculations

- Tributary Area
- Treatment Credit
- Runoff Coefficient
- **Water Quality Volume ($WQ_V$)**
- Water Quality Flow ($WQ_F$)

# Water Quality Volume ($WQ_V$)

- NEW – January 2019

- Ohio EPA updated the Construction General Permit
- New Runoff Coefficient: $R_V$
- New Precipitation Depth: 0.90 inches

# NEW: Runoff Coefficient – $WQ_V$ BMP

- Right-of-Way = 1.1 ac; 100% Impervious
- Woods = 2.9 ac; 0% Impervious
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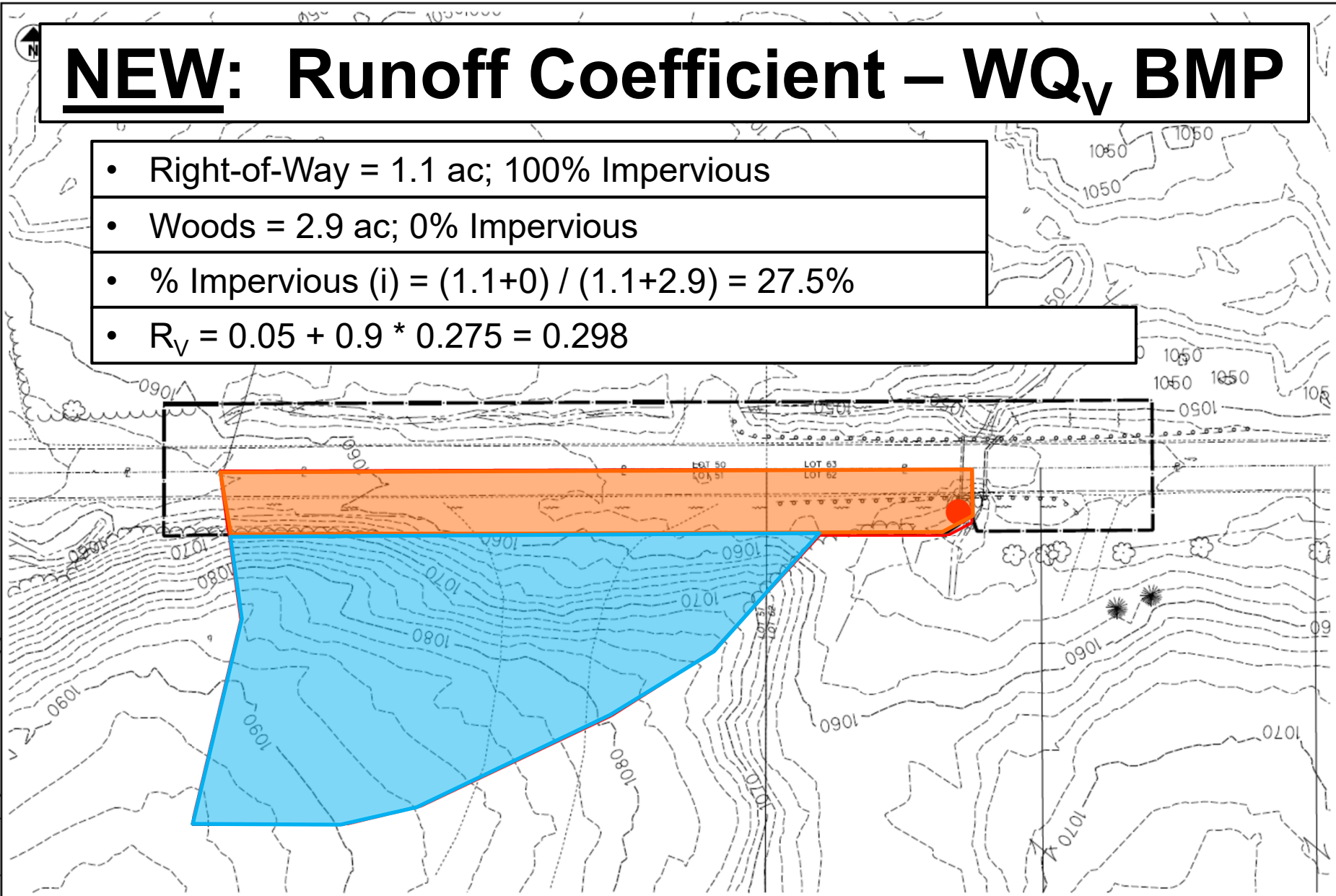

# NEW Water Quality Volume ($WQ_V$)

- **NEW – January 2019**
- **Example:**

- **$WQ_V = (R_V * P * A) / 12$**
  - P = 0.90 in
  - A = 4.0 ac
  - $R_V$ = 0.298
- **$WQ_V = (0.90 \text{ in} * 4.0 \text{ ac} * 0.298) / 12$**
- **$WQ_V = 0.089$ ac-ft**
- **$WQ_V = 3{,}894 \text{ ft}^3$**

# NEW Water Quality Volume ($WQ_V$)

- NEW – January 2019
- Example:

- Exact Same Site
- December 2018: $WQ_V = 2{,}309\ ft^3$
- January 2019: $WQ_V = 3{,}894\ ft^3$
- 69% larger $WQ_V$

# Preliminary BMP Calculations

- Tributary Area
- Treatment Credit
- Runoff Coefficient
- Water Quality Volume ($WQ_V$)
- Water Quality Flow ($WQ_F$)

# Water Quality Flow ($WQ_F$)

- L&D Vol. 2, Sec. 1115.5 Water Quality Flow
- Used for manufactured systems and vegetated biofilters
- Use i = 0.65 in/hr in the Rational Method for vegetated biofilters
- 0.65 in/hr treats 90% of average annual flows
- Use i consistent with time of concentration for manufactured systems

# Coefficient of Runoff – $WQ_F$ BMP

- Right-of-Way = 1.1 ac; C = 0.9
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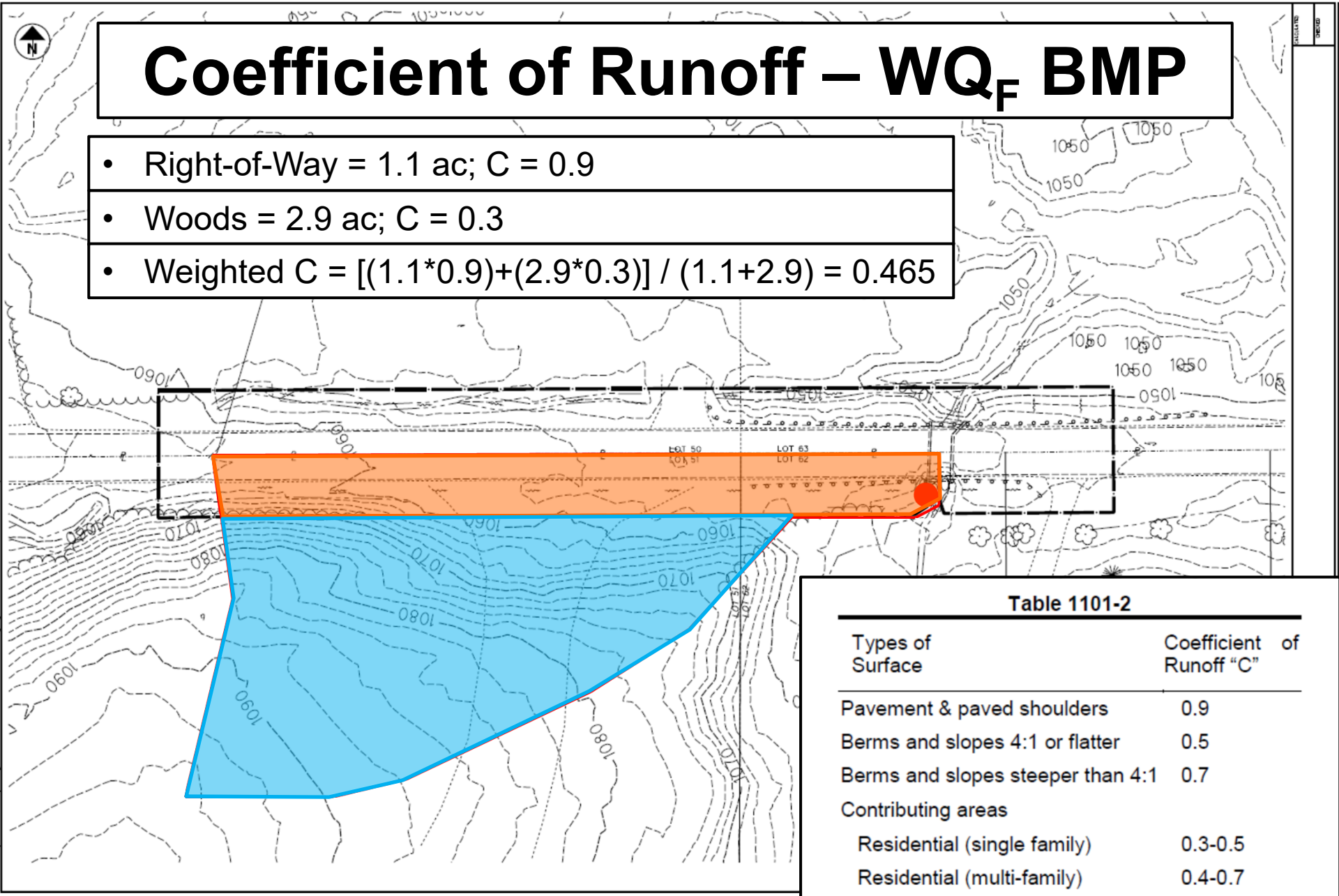
- Weighted C = [(1.1*0.9)+(2.9*0.3)] / (1.1+2.9) = 0.465

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# Water Quality Flow ($WQ_F$)

- **Example Vegetated Biofilter:**

- **Q = CiA**
  - C = 0.465
  - i = 0.65 in/hr
  - A = 4.0 ac
- **Q = 0.465 * 0.65 in/hr * 4.0 ac**
- **Q = 1.209 cfs**

# Water Quality Flow ($WQ_F$)

- NEW – January 2019
- Different rules for different BMPs
- Vegetated Biofilters sized as before with i = 0.65 in/hr
- Manufactured Systems sized with an intensity – duration table using time of concentration to determine intensity

# Water Quality Flow ($WQ_F$)

- **NEW – January 2019**
- **Manufactured Systems**
- **Determine time of concentration ($t_c$)**
  - $t_{overland} + t_{shallow\ concentrated} + t_{channel\ flow}$
  - For this example:
  - $t_o$ = 15 min.
  - $t_s$ = 2.5 min.
  - $t_{ch}$ = 1.5 min.
  - $t_c$ = 19 min.

Appendix C Intensity for Calculation of Water Quality Flow (WQF)

| DURATION $t_c$ (minutes) | WATER QUALITY INTENSITY [$i_{wq}$] (inches/hour) |
|---|---|
| 5 | 2.37 |
| 6 | 2.26 |
| 7 | 2.15 |
| 8 | 2.04 |
| 9 | 1.94 |
| 10 | 1.85 |
| 11 | 1.76 |
| 12 | 1.68 |
| 13 | 1.62 |
| 14 | 1.56 |
| 15 | 1.51 |
| 16 | 1.46 |
| 17 | 1.41 |
| 18 | 1.37 |
| 19 | 1.33 |
| 20 | 1.29 |
| 21 | 1.26 |
| 22 | 1.22 |
| 23 | 1.19 |
| 24 | 1.16 |
| 25 | 1.13 |
| 26 | 1.10 |
| 27 | 1.07 |
| 28 | 1.05 |
| 29 | 1.03 |
| 30 | 1.01 |
| 31 | 0.99 |
| 32 | 0.97 |

| DURATION $t_c$ (minutes) | WATER QUALITY INTENSITY [$i_{wq}$] (inches/hour) |
|---|---|
| 33 | 0.95 |
| 34 | 0.93 |
| 35 | 0.92 |
| 36 | 0.90 |
| 37 | 0.88 |
| 38 | 0.86 |
| 39 | 0.85 |
| 40 | 0.83 |
| 41 | 0.82 |
| 42 | 0.80 |
| 43 | 0.78 |
| 44 | 0.77 |
| 45 | 0.76 |
| 46 | 0.75 |
| 47 | 0.74 |
| 48 | 0.73 |
| 49 | 0.72 |
| 50 | 0.71 |
| 51 | 0.69 |
| 52 | 0.68 |
| 53 | 0.67 |
| 54 | 0.66 |
| 55 | 0.66 |
| 56 | 0.65 |
| 57 | 0.64 |
| 58 | 0.64 |
| 59 | 0.63 |
| 60 | 0.62 |

Note: For $t_c$ < 5 minutes, use i = 2.37 in/hr; for $t_c$ > 60 minutes, use i = 0.62 in/hr. For all other $t_c$, use the appropriate value from this table.

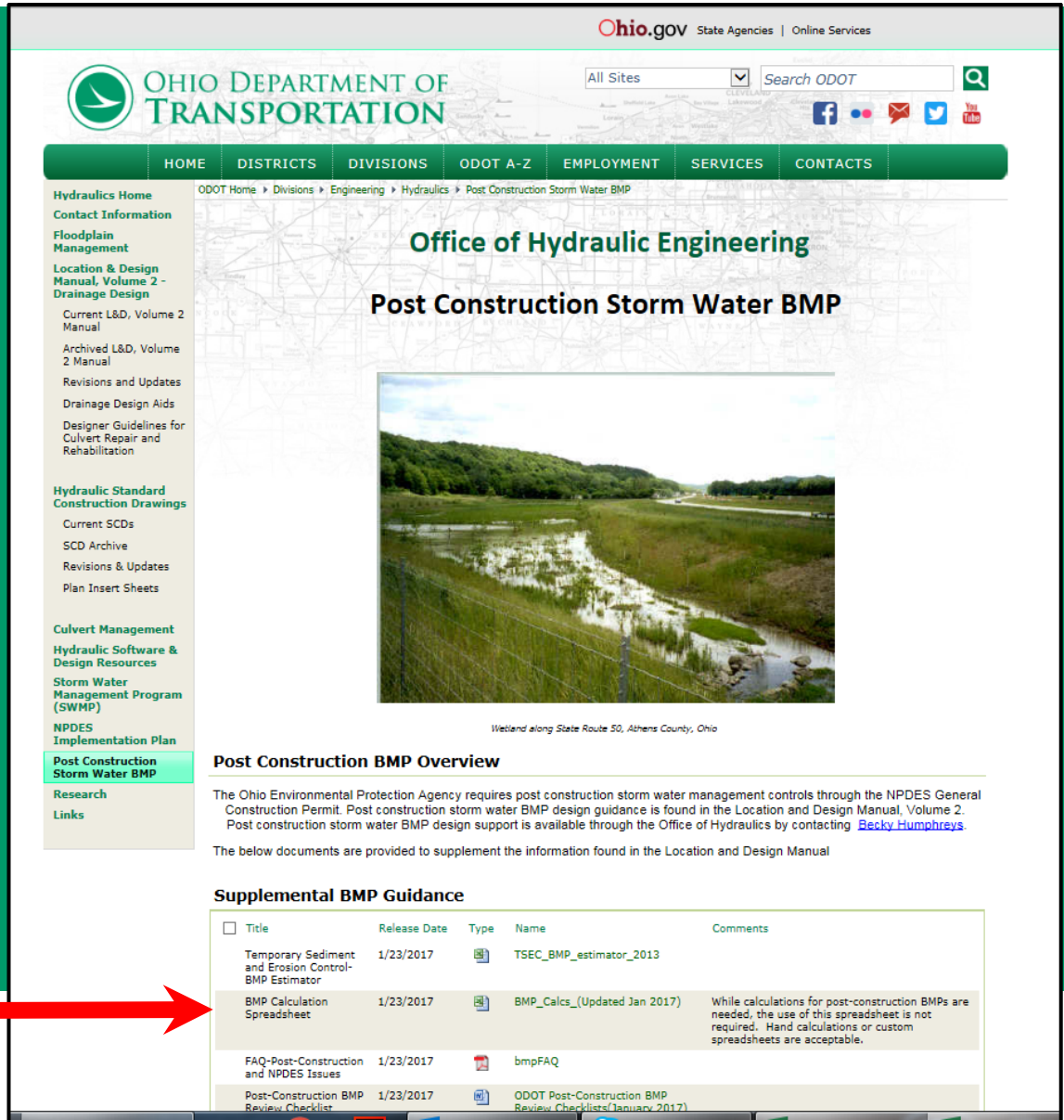
# Water Quality Flow ($WQ_F$)

- **NEW – Manufactured System Example:**

- **Q = CiA**
  - C = 0.465
  - i = 1.33 in/hr
  - A = 4.0 ac
- **Q = 0.465 * 1.33 in/hr * 4.0 ac**
- **Q = 2.474 cfs**
- **105% higher than before**

# BMP_Calcs Spreadsheet

- ODOT Hydraulics internet site
  - Post Construction Storm Water BMP page



# Project Summary

Ohio Department of Transportation - Office of Hydraulic Engineering

**Post-Construction BMP Calculation Spreadsheet**

## Post Construction - Project Summary

**Project Data**

| Insert Project Name/PID (County-Route-Section, PID) | | Units |
|---|---|---|
| Project EDA | 20 | acres |
| Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2? | No | NA |
| BMPs Required? | **BMPs Required** | NA |

**Type of Treatment Required**

| | | |
|---|---|---|
| Is the Project Redevelopment per L&D Vol. 2, Sec. 1115.6.1? | No | NA |
| Ain (New Impervious Area in New Permanent R/W | 0.5 | acres |
| Does Entire Site Drain to Large River (>100 sq. miles)? | No | NA |
| Water Quality Treatment Required | **Yes** | NA |
| Water Quantity Treatment Required | **No** | NA |

**Treatment Percent and Treatment Area Requirement**

| | | |
|---|---|---|
| Aix (Project EDA that is inside the existing R/W) | 16 | acres |
| Ain (New Impervious Area in New Permanent R/W) | 0.5 | acres |
| **T% (Treatment Percent)** | **22.42** | **%** |
| **Treatment Requirement** | **4.48** | **acres** |

# $WQ_V$

Ohio Department of Transportation - Office of Hydraulic Engineering

**Post-Construction BMP Calculation Spreadsheet**

## Water Quality Volume ($WQ_V$)

| Drainage Area #1 | Values | Units |
|---|---|---|
| Tributary Area within Existing R/W | 5.80 | acres |
| Impervious Trib. Area Outside Existing R/W | 0.00 | acres |
| Pervious Trib. Area Outside Existing R/W | 1.70 | acres |
| Total Tributary Area | 7.50 | acres |
| Impervious Tributary Area | 5.80 | acres |
| | | |
| Impervious fraction (i) | 0.77 | fraction |
| Volumetric Runoff Coefficient ($R_V$) | 0.75 | NA |
| Precipitation (P) | 0.90 | inches |
| | | |
| **$WQ_V$** | **0.420** | ac-ft |

# $WQ_F$

Ohio Department of Transportation - Office of Hydraulic Engineering

**Post-Construction BMP Calculation Spreadsheet**

## Water Quality Flow Rate ($WQ_F$)

| Drainage Area #1 | Area (acres) | Coefficient of Runoff (C) |
|---|---|---|
| Tributary Area within Existing R/W | 2.00 | 0.9 |
| Impervious Trib. Area Outside Existing R/W | 0.50 | 0.9 |
| Tributary Area Land Use #3 | 1.00 | 0.5 |
| Tributary Area Land Use #4 | 0.50 | 0.3 |
| Total Tributary Area | 4.00 | 0.725 |
| | | |
| BMP Type | Vegetated Biofilter | |
| Time of Concentration (minutes) | NA | |
| Intensity, i (in/hr) | 0.65 | |
| **Water Quality Flow ($WQ_F$)** | **1.885** | **cfs** |

# Questions ?

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