

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **N**

From Sta.:	10 + 0	Elevation Tool (ft)	0
to Sta.:	10 + 75		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **45** feet
 Length of Run: **X 75** feet
 Disturbed Area: **= 0.08** acres
 Drainage Area: **0.08** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

ERODES
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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **38** feet

Choose between Type B Rock Silt Checks or Wattles

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	800.69 ft ³ /ac/yr	
Required Storage Volume=	62.04 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0
Total	76.46 ft ³

Option of using Wrapped Type A Rock Silt Checks or Wattles

Excessive number of devices required. Go to Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

Use Sediment Dam type b(9x3x3) and 1 rock silt check. Device covers required storage.

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q10

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.08** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.08**

Required Sediment Storage (ft³)= **139.46** ft³

Final Required Storage: **139.46** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: **1.5** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: **1.5** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **N**

From Sta.:	10 + 0	Elevation Tool (ft)	0
to Sta.:	12 + 25		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **10** feet
 Length of Run: **X 225** feet
 Disturbed Area: **= 0.05** acres
 Drainage Area: **0.05** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **45** feet

Choose between Type B Rock Silt Checks or Wattles

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	667.04 ft ³ /ac/yr	
Required Storage Volume=	34.45 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	X 2.0
Total	38.23 ft ³

Option of using Wrapped Type A Rock Silt Checks or Wattles

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment Dam type b(12x4x4). Device covers required storage.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q10

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.05** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.05**

Required Sediment Storage (ft³)= **92.98** ft³

Final Required Storage: **92.98** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	54.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: **1.5** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: **1.5** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

SECTION 3 of 55

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **N**

From Sta.:	11	+	67	Elevation Tool (ft)	0
to Sta.:	14	+	0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **62** feet
 Length of Run **X** **233** feet
 Disturbed Area = **0.33** acres
 Drainage Area: **0.33** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **39** feet

Choose between Type B Rock Silt Checks or Wattles

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	934.13 ft ³ /ac/yr	
Required Storage Volume=	309.79 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	19.0 ft ³
Total	311.30 ft ³

Option of using Wrapped Type A Rock Silt Checks or Wattles

Excessive number of devices required. Go to Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q10

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.33** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.33**

Required Sediment Storage (ft³)= **596.94** ft³

Final Required Storage: **596.94** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	4
Suggested Top Length (ft):	8
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	5
Suggested Top Length (ft):	10
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Use 60 Day Option. Use sediment dam type b(9x3x3) and 5 rock silt checks. Devices cover required storage.

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **N**

From Sta.:	14 + 30	Elevation Tool (ft)	0
to Sta.:	23 + 92		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **109** feet
 Length of Run: **X 962** feet
 Disturbed Area: **= 2.41** acres
 Drainage Area: **2.41** acres

Surface Dewatering Device
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model
 the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **22** spaced at **42** feet

Choose between Type B Rock Silt Checks or Wattles

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 5

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	934.13 ft ³ /ac/yr	
Required Storage Volume=	2248.65 ft ³	See Option 5

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 5

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	X Go to Option 5
Total	N/A ft ³

Option of using Wrapped Type A Rock Silt Checks or Wattles

See Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q10

$Q_p = CIA$

Runoff Coefficient, **C** **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c ($A \leq 4.65$)

Watershed Slope, **S** **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, **L** **0** feet

*see Module 1 Eq. 3

Watershed Slope, **S** **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (**T**) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, **i** (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, **i** (in/hr) **0** in/hr Appendix A
 Drainage Area given as **2.41** acres
 Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (**A**) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**
 Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **2.41**
 Required Sediment Storage (ft³)= **4332.98** ft³

Final Required Storage: **4332.98** ft³

Proposed Basin Side Slopes: **0.0 :1** side slopes *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	10
Suggested Top Length (ft):	20
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	13
Suggested Top Length (ft):	26
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Use 30 Day Option. Use 1 Sediment dam type b(9x3x3) with 1 Silt Basin type b(9x3x3) and 22 rock silt checks. Devices cover meet required storage.

STEP 1: Input Project Information *Items in red are REQUIRED

SECTION 5 of 55

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **N**

From Sta.:	23 + 92	Elevation Tool (ft)	0
to Sta.:	29 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **126** feet
 Length of Run: **X 508** feet
 Disturbed Area: **= 1.47** acres
 Drainage Area: **1.47** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **11** spaced at **42** feet

Choose between Type B Rock Silt Checks or Wattles

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 5

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	934.13 ft ³ /ac/yr	
Required Storage Volume=	1372.63 ft ³	See Option 5

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 5

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

*These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	X Go to Option 5
Total	N/A ft ³

Option of using Wrapped Type A Rock Silt Checks or Wattles

See Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

Empty comment box

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q10

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr)

0 in/hr

Appendix A

Drainage Area given as

1.47 acres

Peak Rate of Runoff, $Q_p = CIA$

0.00 cfs

b. Determine the Required Surface Area=

0.00 ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

3

Required **VOLUME** using the design depth:

0.00 ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)=

1.47

Required Sediment Storage (ft³)=

2644.96 ft³

Final Required Storage:

2644.96 ft³

Proposed Basin Side Slopes:

0.0 :1 side slopes *must be at least 1.5:1 or flatter

Infiltration Analysis

Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design	
<i>Minimum 2:1 (L:W) Ratio</i>	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00
	Too Low
Verify Surface Area (ft ²)	27.00
	OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.

If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	8
Suggested Top Length (ft):	16
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	10
Suggested Top Length (ft):	20
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Use 30 Day Option. Use 1 Sediment dam type b(9x3x3) with 1 Silt Basin type b(9x3x3) and 11 rock silt checks. Devices meet storage requirements.

STEP 1: Input Project Information *Items in red are REQUIRED

SECTION 6 of 55

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	31 + 0	Elevation Tool (ft)	0
to Sta.:	34 + 40		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **165** feet
 Length of Run: **X 340** feet
 Disturbed Area: **= 1.29** acres
 Drainage Area: **1.29** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

ERODES
 EROsion DESIGN

Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **4** spaced at **68** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 5

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	687.46 ft ³	See Option 5

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 5

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X Go to Option 5
Total	N/A ft ³

WATTLES REQUIRED

See Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

Empty comment box

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A
 Drainage Area given as **1.29** acres
 Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:
 Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **1.29**
 Required Sediment Storage (ft³)= **2318.18** ft³

Final Required Storage: **2318.18** ft³

Proposed Basin Side Slopes: **0.0 :1** side slopes *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	0
Verify Storage (ft ³)	0.00 Too Low
Verify Surface Area (ft ²)	0.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	6
Suggested Top Length (ft):	12
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	2
Verify Storage (ft ³)	81.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Use 30 Day Option. Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	31 + 0	Elevation Tool (ft)	0
to Sta.:	34 + 40		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **22** feet
 Length of Run: **X 340** feet
 Disturbed Area: **= 0.17** acres
 Drainage Area: **0.17** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **68** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	

V= **533.79** ft³/ac/yr

Required Storage Volume= **91.66** ft³

Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2: **0.00** tons/acre/yr
 Converting to ft³/ac/yr: **N/A** ft³/ac/yr

Required Storage Volume= **N/A** ft³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0 ft ³
Total	114.69 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr

Appendix A

Drainage Area given as **0.17** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.17**

Required Sediment Storage (ft³)= **309.09** ft³

Final Required Storage: **309.09** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	34 + 40	Elevation Tool (ft)	0
to Sta.:	35 + 90		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **90** feet
 Length of Run: **X 150** feet
 Disturbed Area: **= 0.31** acres
 Drainage Area: **0.31** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **1** spaced at **75** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	165.43 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 6.0
Total	172.04 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(12x4x3) and 1 wattle. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.31** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.31**

Required Sediment Storage (ft³)= **557.85** ft³

Final Required Storage: **557.85** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	144.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

SECTION 9 of 55

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	34 + 40	Elevation Tool (ft)	0
to Sta.:	38 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **23** feet
 Length of Run: **X 360** feet
 Disturbed Area: **= 0.19** acres
 Drainage Area: **0.19** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **72** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	101.46 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0 ft ³
Total	114.69 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.19** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.19**

Required Sediment Storage (ft³)= **342.15** ft³

Final Required Storage: **342.15** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	35 + 90	Elevation Tool (ft)	0
to Sta.:	38 + 25		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **89** feet
 Length of Run: **X 235** feet
 Disturbed Area: **= 0.48** acres
 Drainage Area: **0.48** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C	659	Table 2-7 (Level III Ref Manual)
Rainfall Factor, R	135	Figure 2-1
Erodibility Factor, K	0.15	Table 2-2 or Web Soil Survey (http://soildatamart.nrcs.usda.gov/)
Soil Type	EvD Evard, stony	* informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **59** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	256.30 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 9.0
Total	258.05 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.48** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: 3

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.48**

Required Sediment Storage (ft³)= **864.26** ft³

Final Required Storage: **864.26** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	4
Suggested Top Length (ft):	8
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	38 + 0	Elevation Tool (ft)	0
to Sta.:	39 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **53** feet
 Length of Run **X 100** feet
 Disturbed Area = **0.12** acres
 Drainage Area: **0.12** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **50** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	67.63 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	3.0
Total	68.81 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(12x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.12** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.12**

Required Sediment Storage (ft³)= **219.01** ft³

Final Required Storage: **219.01** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	72.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	38 + 25	Elevation Tool (ft)	0
to Sta.:	39 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **19** feet
 Length of Run **X** **125** feet
 Disturbed Area = **0.05** acres
 Drainage Area: **0.05** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **2** spaced at **42** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	30.31 ft ³	

Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2: **0.00** tons/acre/yr
 Converting to ft³/ac/yr: **N/A** ft³/ac/yr
 Required Storage Volume= **N/A** ft³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V): **3** :1
 Enter Ditch Back Slope Gradient (H:V): **1.5** :1
 Enter Device Height: **1.3** ft
 Area Behind Device: 3.98 ft²
 Length of Ditch Behind Device: 26.60 ft
 Storage Behind Device (assumes 65% efficiency): **22.94** ft³
 Wrapped TRSC-A/Wattles required: **2.0**
 Total **45.88** ft³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(8x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.05** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.05**

Required Sediment Storage (ft³)= **98.14** ft³

Final Required Storage: **98.14** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	8
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	32.00 Too Low
Verify Surface Area (ft ²)	32.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	39 + 50	Elevation Tool (ft)	0
to Sta.:	41 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **60** feet
 Length of Run: **X 200** feet
 Disturbed Area: **= 0.28** acres
 Drainage Area: **0.28** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **100** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	110.29 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	114.69 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 1 wattle. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.28** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.28**

Required Sediment Storage (ft³)= **495.87** ft³

Final Required Storage: **495.87** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: 25.37 ft³
 Design Depth (ft): 3
 Proposed Basin Side Slopes: **0** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: N/A ft³
 Design Depth (ft): 3
 Proposed Basin Side Slopes: **0** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	41	+	50	Elevation Tool (ft)	0
to Sta.:	43	+	0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **20** feet
 Length of Run: **X 150** feet
 Disturbed Area: **= 0.07** acres
 Drainage Area: **0.07** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **3** spaced at **38** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	778.21 ft ³ /ac/yr	
Required Storage Volume=	53.60 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0 ft ³
Total	65.54 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(12x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.07** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.07**

Required Sediment Storage (ft³)= **123.97** ft³

Final Required Storage: **123.97** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	54.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	41 + 50	Elevation Tool (ft)	0
to Sta.:	42 + 11		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **90** feet
 Length of Run: **X 61** feet
 Disturbed Area: **= 0.13** acres
 Drainage Area: **0.13** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Regression Constant, C	549	Table 2-7 (Level III Ref Manual)
Rainfall Factor, R	135	Figure 2-1
Erodibility Factor, K	0.15	Table 2-2 or Web Soil Survey (http://soildatamart.nrcs.usda.gov/)
Soil Type	EvD Evard, stony	* informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **31** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	667.04 ft ³ /ac/yr	
Required Storage Volume=	84.07 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	X 5.0 ft ³
Total	95.58 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(15x5x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.13** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.13**

Required Sediment Storage (ft³)= **226.86** ft³

Final Required Storage: **226.86** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	5
Final Design Top Length (ft):	15
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	90.00 Too Low
Verify Surface Area (ft ²)	75.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	43 + 0	Elevation Tool (ft)	0
to Sta.:	47 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **58** feet
 Length of Run: **X 450** feet
 Disturbed Area: **= 0.60** acres
 Drainage Area: **0.6** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **90** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	239.87 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 7.0
Total	267.61 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(8x4x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.6** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.60**

Required Sediment Storage (ft³)= **1078.51** ft³

Final Required Storage: **1078.51** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	8
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	96.00 Too Low
Verify Surface Area (ft ²)	32.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	4
Suggested Top Length (ft):	8
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	39	+	0	Elevation Tool (ft)	0
to Sta.:	40	+	0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **45** feet
 Length of Run: **X 100** feet
 Disturbed Area: **= 0.10** acres
 Drainage Area: **0.1** acres
 *Drainage Area must equal or exceed the Disturbed Area found above
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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 Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **50** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	57.42 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	68.81 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(12x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr)

0 in/hr

Appendix A

Drainage Area given as

0.1 acres

Peak Rate of Runoff, $Q_p = CIA$

0.00 cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.10**

Required Sediment Storage (ft³)= **185.95** ft³

Final Required Storage: **185.95** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	72.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	Elevation	Tool (ft)
42 + 11		0
to Sta.:		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **65** feet
 Length of Run: **X 139** feet
 Disturbed Area: **= 0.21** acres
 Drainage Area: **0.21** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **2** spaced at **46** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	667.04 ft ³ /ac/yr	
Required Storage Volume=	138.35 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	X 8.0 ft ³
Total	152.92 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(16x8x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.21** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.21**

Required Sediment Storage (ft³)= **373.35** ft³

Final Required Storage: **373.35** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	8
Final Design Top Length (ft):	16
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	156.00 Too Low
Verify Surface Area (ft ²)	128.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	45	+	0	Elevation Tool (ft)	0
to Sta.:	51	+	0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **65** feet
 Length of Run: **X 600** feet
 Disturbed Area: **= 0.90** acres
 Drainage Area: **0.9** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **100** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	333.52 ft ³ /ac/yr	
Required Storage Volume=	298.60 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00	tons/acre/yr
Converting to ft ³ /ac/yr:	N/A	ft ³ /ac/yr
Required Storage Volume=	N/A	ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 8.0
Total	305.84 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(22x11x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr)

0 in/hr

Appendix A

Drainage Area given as

0.9 acres

Peak Rate of Runoff, $Q_p = CIA$

0.00 cfs

b. Determine the Required Surface Area=

0.00 ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

3

Required **VOLUME** using the design depth:

0.00 ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)=

0.90

Required Sediment Storage (ft³)=

1611.57 ft³

Final Required Storage:

1611.57 ft³

Proposed Basin Side Slopes:

1.5 :1 side slopes *must be at least 1.5:1 or flatter

Infiltration Analysis

Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design	
<i>Minimum 2:1 (L:W) Ratio</i>	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	11
Final Design Top Length (ft):	22
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	7
Verify Storage (ft ³)	361.50 Too Low
Verify Surface Area (ft ²)	242.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.

If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	4
Suggested Top Length (ft):	8
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	48 + 0	Elevation Tool (ft)	0
to Sta.:	49 + 87		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **23** feet
 Length of Run: **X 187** feet
 Disturbed Area: **= 0.10** acres
 Drainage Area: **0.1** acres
 *Drainage Area must equal or exceed the Disturbed Area found above
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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 Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **2** spaced at **62** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	52.71 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

*These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 2.0
Total	57.35 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 2 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.1** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.10**

Required Sediment Storage (ft³)= **177.73** ft³

Final Required Storage: **177.73** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	49 + 87	Elevation Tool (ft)	0
to Sta.:	54 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **33** feet
 Length of Run: **X 463** feet
 Disturbed Area: **= 0.35** acres
 Drainage Area: **0.35** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **93** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	140.42 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0
Total	152.92 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.35** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.35**

Required Sediment Storage (ft³)= **631.36** ft³

Final Required Storage: **631.36** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design	
<i>Minimum 2:1 (L:W) Ratio</i>	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	53 + 50	Elevation Tool (ft)	0
to Sta.:	55 + 29		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **8.000** %
 Contributing
 R/W Width: **68** feet
 Length of Run: **X 179** feet
 Disturbed Area: **= 0.28** acres
 Drainage Area: **0.28** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **36** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.08000 ft/ft	
V=	889.38 ft ³ /ac/yr	
Required Storage Volume=	248.52 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	16.63 ft
Storage Behind Device (assumes 65% efficiency):	14.34 ft ³
Wrapped TRSC-A/Wattles required:	X 18.0 ft ³
Total	258.05 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(20x10x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.28** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.28**

Required Sediment Storage (ft³)= **502.98** ft³

Final Required Storage: **502.98** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	10
Final Design Top Length (ft):	20
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	5
Verify Storage (ft ³)	276.00 Too Low
Verify Surface Area (ft ²)	200.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*.
See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.
If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	4
Suggested Top Length (ft):	8
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	54 + 50	Elevation Tool (ft)	0
to Sta.:	56 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **8.000** %
 Contributing
 R/W Width: **38** feet
 Length of Run: **X 150** feet
 Disturbed Area: **= 0.13** acres
 Drainage Area: **0.13** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **38** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.08000 ft/ft	
V=	889.38 ft ³ /ac/yr	
Required Storage Volume=	116.38 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	16.63 ft
Storage Behind Device (assumes 65% efficiency):	14.34 ft ³
Wrapped TRSC-A/Wattles required:	X 9.0 ft ³
Total	129.03 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(18x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.13** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.13**

Required Sediment Storage (ft³)= **235.54** ft³

Final Required Storage: **235.54** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	135.00 Too Low
Verify Surface Area (ft ²)	108.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	56 + 0	Elevation Tool (ft)	0
to Sta.:	57 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **35** feet
 Length of Run: **X 100** feet
 Disturbed Area: **= 0.08** acres
 Drainage Area: **0.08** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C	659	Table 2-7 (Level III Ref Manual)
Rainfall Factor, R	135	Figure 2-1
Erodibility Factor, K	0.15	Table 2-2 or Web Soil Survey (http://soildatamart.nrcs.usda.gov/)
Soil Type	EvD Evard, stony	* informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **50** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	667.24 ft ³ /ac/yr	
Required Storage Volume=	53.61 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	68.81 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(9x3x3) and 1 wattle. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.08** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.08**

Required Sediment Storage (ft³)= **144.63** ft³

Final Required Storage: **144.63** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	57 + 0	Elevation Tool (ft)	0
to Sta.:	58 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **9.000** %
 Contributing
 R/W Width: **35** feet
 Length of Run **X 150** feet
 Disturbed Area = **0.12** acres
 Drainage Area: **0.12** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **30** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.09000 ft/ft	
V=	1000.55 ft ³ /ac/yr	
Required Storage Volume=	120.59 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	14.78 ft
Storage Behind Device (assumes 65% efficiency):	12.74 ft ³
Wrapped TRSC-A/Wattles required:	10.0
Total	127.43 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(18x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.12** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required VOLUME of Temporary Type-B Sediment Dam

Design Depth:

Required VOLUME using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.12**

Required Sediment Storage (ft³)= **216.94** ft³

Final Required Storage: **216.94** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design	
<i>Minimum 2:1 (L:W) Ratio</i>	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	135.00
	Too Low
Verify Surface Area (ft ²)	108.00
	OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	56 + 50	Elevation Tool (ft)	0
to Sta.:	58 + 50		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **9.000** %
 Contributing
 R/W Width: **44** feet
 Length of Run: **X 200** feet
 Disturbed Area: **= 0.20** acres
 Drainage Area: **0.2** acres
 *Drainage Area must equal or exceed the Disturbed Area found above
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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 Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **33** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.09000 ft/ft	
V=	1000.55 ft ³ /ac/yr	
Required Storage Volume=	202.13 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	14.78 ft
Storage Behind Device (assumes 65% efficiency):	12.74 ft ³
Wrapped TRSC-A/Wattles required:	X 16.0 ft ³
Total	203.90 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(18x9x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.2** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required VOLUME of Temporary Type-B Sediment Dam

Design Depth:

Required VOLUME using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.20**

Required Sediment Storage (ft³)= **363.64** ft³

Final Required Storage: **363.64** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design	
<i>Minimum 2:1 (L:W) Ratio</i>	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	9
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	4
Verify Storage (ft ³)	202.50
	Too Low
Verify Surface Area (ft ²)	162.00
	OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	58 + 50	Elevation Tool (ft)	0
to Sta.:	60 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **64** feet
 Length of Run: **X 200** feet
 Disturbed Area: **= 0.29** acres
 Drainage Area: **0.29** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **67** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	156.85 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 6.0
Total	172.04 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

*Designer still has the option of using Option 5 or 6

Use Sediment dam type b(12x4x3) and 2 wattles. Devices meet storage requirements.

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.29** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.29**

Required Sediment Storage (ft³)= **528.93** ft³

Final Required Storage: **528.93** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	144.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	60	+	0	Elevation Tool (ft)	0
to Sta.:	61	+	50		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **16** feet
 Length of Run **X** **150** feet
 Disturbed Area = **0.06** acres
 Drainage Area: **0.06** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **75** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	444.69 ft ³ /ac/yr	
Required Storage Volume=	24.50 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	28.67 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.06** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.06**

Required Sediment Storage (ft³)= **99.17** ft³

Final Required Storage: **99.17** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	27.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	1
Suggested Top Length (ft):	2
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	60 + 50	Elevation Tool (ft)	0
to Sta.:	62 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **55** feet
 Length of Run: **X 200** feet
 Disturbed Area: **= 0.25** acres
 Drainage Area: **0.25** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **2** spaced at **67** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	134.80 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

*These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 5.0
Total	143.36 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(9x3x3) and 2 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.25** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.25**

Required Sediment Storage (ft³)= **454.55** ft³

Final Required Storage: **454.55** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	55 + 29	Elevation Tool (ft)	0
to Sta.:	56 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **8.000** %
 Contributing
 R/W Width: **73** feet
 Length of Run: **X 71** feet
 Disturbed Area: **= 0.12** acres
 Drainage Area: **0.12** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **36** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.08000 ft/ft	
V=	889.38 ft ³ /ac/yr	
Required Storage Volume=	105.82 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	16.63 ft
Storage Behind Device (assumes 65% efficiency):	14.34 ft ³
Wrapped TRSC-A/Wattles required:	X 8.0 ft ³
Total	114.69 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(14x7x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.12** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.12**

Required Sediment Storage (ft³)= **214.17** ft³

Final Required Storage: **214.17** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	7
Final Design Top Length (ft):	14
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	115.50 Too Low
Verify Surface Area (ft ²)	98.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	62 + 0	Elevation Tool (ft)	0
to Sta.:	63 + 53		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **67** feet
 Length of Run **X 153** feet
 Disturbed Area = **0.24** acres
 Drainage Area: **0.24** acres
 *Drainage Area must equal or exceed the Disturbed Area found above
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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 Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **38** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	778.21 ft ³ /ac/yr	
Required Storage Volume=	183.14 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	12.0
Total	196.61 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(18x9x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A
 Drainage Area given as **0.24** acres
 Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:
 Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.24**
 Required Sediment Storage (ft³)= **423.60** ft³

Final Required Storage: **423.60** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	9
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	4
Verify Storage (ft ³)	202.50 Too Low
Verify Surface Area (ft ²)	162.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	63 + 53	Elevation Tool (ft)	0
to Sta.:	65 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **50** feet
 Length of Run **X** **147** feet
 Disturbed Area = **0.17** acres
 Drainage Area: **0.17** acres
**Drainage Area must equal or exceed the Disturbed Area found above*
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **37** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	778.21 ft ³ /ac/yr	
Required Storage Volume=	131.31 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	9.0
Total	147.46 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(18x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.17** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.17**

Required Sediment Storage (ft³)= **303.72** ft³

Final Required Storage: **303.72** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	135.00 Too Low
Verify Surface Area (ft ²)	108.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³

Design Depth (ft):

Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³

Design Depth (ft):

Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	62 + 50	Elevation Tool (ft)	0
to Sta.:	63 + 65		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **25** feet
 Length of Run: **X 115** feet
 Disturbed Area: **= 0.07** acres
 Drainage Area: **0.07** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **2** spaced at **38** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	778.21 ft ³ /ac/yr	
Required Storage Volume=	51.36 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	X 4.0 ft ³
Total	65.54 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(12x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.07** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.07**

Required Sediment Storage (ft³)= **118.80** ft³

Final Required Storage: **118.80** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	54.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	63 + 65	Elevation Tool (ft)	0
to Sta.:	65 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **7.000** %
 Contributing
 R/W Width: **38** feet
 Length of Run **X** **135** feet
 Disturbed Area = **0.12** acres
 Drainage Area: **0.12** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **34** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.07000 ft/ft	
V=	778.21 ft ³ /ac/yr	
Required Storage Volume=	91.65 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	19.00 ft
Storage Behind Device (assumes 65% efficiency):	16.38 ft ³
Wrapped TRSC-A/Wattles required:	6.0
Total	98.31 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(14x7x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.12** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.12**

Required Sediment Storage (ft³)= **211.98** ft³

Final Required Storage: **211.98** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	7
Final Design Top Length (ft):	14
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	115.50 Too Low
Verify Surface Area (ft ²)	98.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	65 + 0	Elevation Tool (ft)	0
to Sta.:	66 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **13** feet
 Length of Run: **X 150** feet
 Disturbed Area: **= 0.04** acres
 Drainage Area: **0.04** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS **1** spaced at **75** feet
 OR WATTLES

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	17.92 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	38.23 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 1 wattle. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.04** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.04**

Required Sediment Storage (ft³)= **80.58** ft³

Final Required Storage: **80.58** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 OK
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	1
Suggested Top Length (ft):	2
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	66 + 0	Elevation Tool (ft)	0
to Sta.:	69 + 27		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **41** feet
 Length of Run **X 327** feet
 Disturbed Area = **0.31** acres
 Drainage Area: **0.31** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **6** spaced at **47** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	667.04 ft ³ /ac/yr	
Required Storage Volume=	205.30 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	11.0
Total	210.27 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(24x8x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.31** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.31**

Required Sediment Storage (ft³)= **554.01** ft³

Final Required Storage: **554.01** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	8
Final Design Top Length (ft):	24
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	5
Verify Storage (ft ³)	252.00 Too Low
Verify Surface Area (ft ²)	192.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	66 + 50	Elevation Tool (ft)	0
to Sta.:	69 + 27		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **6.000** %
 Contributing
 R/W Width: **26** feet
 Length of Run: **X 277** feet
 Disturbed Area: **= 0.17** acres
 Drainage Area: **0.17** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **46** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.06000 ft/ft	
V=	667.04 ft ³ /ac/yr	
Required Storage Volume=	110.28 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	22.17 ft
Storage Behind Device (assumes 65% efficiency):	19.12 ft ³
Wrapped TRSC-A/Wattles required:	X 6.0 ft ³
Total	114.69 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(14x7x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr

Appendix A

Drainage Area given as **0.17** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.17**

Required Sediment Storage (ft³)= **297.60** ft³

Final Required Storage: **297.60** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	7
Final Design Top Length (ft):	14
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	115.50 Too Low
Verify Surface Area (ft ²)	98.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: 25.37 ft³
 Design Depth (ft): 3
 Proposed Basin Side Slopes: **0** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: N/A ft³
 Design Depth (ft): 3
 Proposed Basin Side Slopes: **0** :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	76 + 43	Elevation Tool (ft)	0
to Sta.:	81 + 20		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **2.000** %
 Contributing
 R/W Width: **30** feet
 Length of Run: **X 477** feet
 Disturbed Area: **= 0.33** acres
 Drainage Area: **0.33** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **119** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.02000 ft/ft	
V=	266.90 ft ³ /ac/yr	
Required Storage Volume=	87.68 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	66.50 ft
Storage Behind Device (assumes 65% efficiency):	57.35 ft ³
Wrapped TRSC-A/Wattles required:	2.0
Total	114.69 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 3 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.33** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.33**

Required Sediment Storage (ft³)= **591.32** ft³

Final Required Storage: **591.32** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	76 + 13	Elevation Tool (ft)	0
to Sta.:	79 + 40		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **2.000** %
 Contributing
 R/W Width: **28** feet
 Length of Run: **X 327** feet
 Disturbed Area: **= 0.21** acres
 Drainage Area: **0.21** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **109** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.02000 ft/ft	
V=	222.35 ft ³ /ac/yr	
Required Storage Volume=	46.74 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	66.50 ft
Storage Behind Device (assumes 65% efficiency):	57.35 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	57.35 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(12x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.21** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: 3

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.21**

Required Sediment Storage (ft³)= **378.35** ft³

Final Required Storage: **378.35** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	54.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	79 + 40	Elevation Tool (ft)	0
to Sta.:	81 + 20		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **2.000** %
 Contributing
 R/W Width: **53** feet
 Length of Run: **X 180** feet
 Disturbed Area: **= 0.22** acres
 Drainage Area: **0.22** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **90** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.02000 ft/ft	
V=	222.35 ft ³ /ac/yr	
Required Storage Volume=	48.70 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	66.50 ft
Storage Behind Device (assumes 65% efficiency):	57.35 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	57.35 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(12x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.22** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.22**

Required Sediment Storage (ft³)= **394.21** ft³

Final Required Storage: **394.21** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	54.00 Too Low
Verify Surface Area (ft ²)	48.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	81 + 20	Elevation Tool (ft)	0
to Sta.:	85 + 22		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **2.000** %
 Contributing
 R/W Width: **59** feet
 Length of Run **X** **402** feet
 Disturbed Area = **0.54** acres
 Drainage Area: **0.54** acres
**Drainage Area must equal or exceed the Disturbed Area found above*
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **134** feet

Wattles are required in conjunction with PAMs

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.02000 ft/ft	
V=	222.35 ft ³ /ac/yr	
Required Storage Volume=	121.06 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	66.50 ft
Storage Behind Device (assumes 65% efficiency):	57.35 ft ³
Wrapped TRSC-A/Wattles required:	3.0
Total	172.04 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(18x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.54** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.54**

Required Sediment Storage (ft³)= **980.08** ft³

Final Required Storage: **980.08** ft³

Proposed Basin Side Slopes: **1.5 :1** side slopes *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	18
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	135.00 Too Low
Verify Surface Area (ft ²)	108.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	81 + 20	Elevation Tool (ft)	0
to Sta.:	85 + 22		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **2.000** %
 Contributing
 R/W Width: **56** feet
 Length of Run: **X 402** feet
 Disturbed Area: **= 0.52** acres
 Drainage Area: **0.52** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **134** feet

Wattles are required in conjunction with PAMs

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.02000 ft/ft	
V=	266.90 ft ³ /ac/yr	
Required Storage Volume=	137.93 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	66.50 ft
Storage Behind Device (assumes 65% efficiency):	57.35 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	172.04 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 2 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.52** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.52**

Required Sediment Storage (ft³)= **930.25** ft³

Final Required Storage: **930.25** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	85 + 22	Elevation Tool (ft)	0
to Sta.:	87 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **36** feet
 Length of Run: **X 228** feet
 Disturbed Area: **= 0.19** acres
 Drainage Area: **0.19** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **76** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	333.52 ft ³ /ac/yr	
Required Storage Volume=	62.84 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	2.0
Total	76.46 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(12x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.19** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: 3

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.19**

Required Sediment Storage (ft³)= **339.17** ft³

Final Required Storage: **339.17** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	72.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	85 + 22	Elevation Tool (ft)	0
to Sta.:	88 + 50		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **35** feet
 Length of Run: **X 328** feet
 Disturbed Area: **= 0.26** acres
 Drainage Area: **0.26** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **3** spaced at **82** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	105.51 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	114.69 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

*Designer still has the option of using Option 5 or 6

Use Sediment dam type b(9x3x3) and 3 wattles. Devices meet storage requirements.

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.26** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.26**

Required Sediment Storage (ft³)= **474.38** ft³

Final Required Storage: **474.38** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	87	+	50		Elevation Tool (ft)	0
to Sta.:	90	+	0			0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **54** feet
 Length of Run: **X 250** feet
 Disturbed Area: **= 0.31** acres
 Drainage Area: **0.31** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **50** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	172.27 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	X 8.0
Total	183.51 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(21x7x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CiA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.31** acres

Peak Rate of Runoff, $Q_p = CiA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.31**

Required Sediment Storage (ft³)= **557.85** ft³

Final Required Storage: **557.85** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	7
Final Design Top Length (ft):	21
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	4
Verify Storage (ft ³)	189.00 Too Low
Verify Surface Area (ft ²)	147.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	90 + 0	Elevation Tool (ft)	0
to Sta.:	91 + 72		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **40** feet
 Length of Run: **X 172** feet
 Disturbed Area: **= 0.16** acres
 Drainage Area: **0.16** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **57** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	444.69 ft ³ /ac/yr	
Required Storage Volume=	70.24 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 3.0
Total	86.02 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(12x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.16** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: 3

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.16**

Required Sediment Storage (ft³)= **284.30** ft³

Final Required Storage: **284.30** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	72.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.

If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	91 + 72	Elevation Tool (ft)	0
to Sta.:	93 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **20** feet
 Length of Run: **X 128** feet
 Disturbed Area: **= 0.06** acres
 Drainage Area: **0.06** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **64** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	333.52 ft ³ /ac/yr	
Required Storage Volume=	19.60 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	38.23 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.06** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.06**

Required Sediment Storage (ft³)= **105.79** ft³

Final Required Storage: **105.79** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	27.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	1
Suggested Top Length (ft):	2
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	89 + 40	Elevation Tool (ft)	0
to Sta.:	93 + 0		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **33** feet
 Length of Run: **X 360** feet
 Disturbed Area: **= 0.27** acres
 Drainage Area: **0.27** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **72** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	145.58 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 6.0
Total	172.04 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.27** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.27**

Required Sediment Storage (ft³)= **490.91** ft³

Final Required Storage: **490.91** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	93 + 0	Elevation Tool (ft)	0
to Sta.:	97 + 50		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **32** feet
 Length of Run **X** **450** feet
 Disturbed Area = **0.33** acres
 Drainage Area: **0.33** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **75** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	444.69 ft ³ /ac/yr	
Required Storage Volume=	147.00 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	6.0
Total	172.04 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(16x8x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.33** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.33**

Required Sediment Storage (ft³)= **595.04** ft³

Final Required Storage: **595.04** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	8
Final Design Top Length (ft):	16
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	3
Verify Storage (ft ³)	156.00 Too Low
Verify Surface Area (ft ²)	128.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	93 + 0	Elevation Tool (ft)	0
to Sta.:	97 + 9		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **36** feet
 Length of Run: **X 409** feet
 Disturbed Area: **= 0.34** acres
 Drainage Area: **0.34** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **68** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	180.43 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 7.0 ft ³
Total	200.71 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 5 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.34** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.34**

Required Sediment Storage (ft³)= **608.43** ft³

Final Required Storage: **608.43** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.

If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	97 + 50	Elevation Tool (ft)	0
to Sta.:	99 + 20		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **24** feet
 Length of Run: **X 170** feet
 Disturbed Area: **= 0.09** acres
 Drainage Area: **0.09** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **85** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	333.52 ft ³ /ac/yr	
Required Storage Volume=	31.24 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	38.23 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(8x4x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.09** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.09**

Required Sediment Storage (ft³)= **168.60** ft³

Final Required Storage: **168.60** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	4
Final Design Top Length (ft):	8
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	32.00 Too Low
Verify Surface Area (ft ²)	32.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**
 From Sta.: **99** + **20**
 to Sta.: **101** + **50**
 Right/Left: **Rt**
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **50** feet
 Length of Run: **X 230** feet
 Disturbed Area: **= 0.26** acres
 Drainage Area: **0.26** acres
 *Drainage Area must equal or exceed the Disturbed Area found above
 Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**
 Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **2** spaced at **77** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**
 Ditchline Slope, s **0.03000** ft/ft
 V= **333.52** ft³/ac/yr
 Required Storage Volume= **88.05** ft³

From Step 1 above

Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2: **0.00** tons/acre/yr
 Converting to ft³/ac/yr: **N/A** ft³/ac/yr
 Required Storage Volume= **N/A** ft³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V): **3** :1
 Enter Ditch Back Slope Gradient (H:V): **1.5** :1
 Enter Device Height: **1.3** ft
 Area Behind Device: **3.98** ft²
 Length of Ditch Behind Device: **44.33** ft
 Storage Behind Device (assumes 65% efficiency): **38.23** ft³
 Wrapped TRSC-A/Wattles required: **X 3.0**
 Total **114.69** ft³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(15x5x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.26** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.26**

Required Sediment Storage (ft³)= **475.21** ft³

Final Required Storage: **475.21** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	5
Final Design Top Length (ft):	15
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	90.00 Too Low
Verify Surface Area (ft ²)	75.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts.

If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	97 + 9	Elevation Tool (ft)	0
to Sta.:	101 + 20		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **28** feet
 Length of Run: **X 411** feet
 Disturbed Area: **= 0.26** acres
 Drainage Area: **0.26** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **69** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	141.02 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 5.0 ft ³
Total	143.36 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 4 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.26** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.26**

Required Sediment Storage (ft³)= **475.54** ft³

Final Required Storage: **475.54** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	3
Suggested Top Length (ft):	6
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10', it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	101 + 50	Elevation Tool (ft)	0
to Sta.:	103 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **16** feet
 Length of Run: **X 150** feet
 Disturbed Area: **= 0.06** acres
 Drainage Area: **0.06** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **659**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **75** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	400.34 ft ³ /ac/yr	
Required Storage Volume=	22.06 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	X 1.0
Total	38.23 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 1 wattle. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.06** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.06**

Required Sediment Storage (ft³)= **99.17** ft³

Final Required Storage: **99.17** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	1
Suggested Top Length (ft):	2
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	103 + 0	Elevation Tool (ft)	0
to Sta.:	106 + 0		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **12** feet
 Length of Run **X** **300** feet
 Disturbed Area = **0.08** acres
 Drainage Area: **0.08** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **4** spaced at **60** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	45.94 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	3.0
Total	68.81 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(10x5x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, t_c (A≤4.6S)**

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr

Appendix A

Drainage Area given as **0.08** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.08**

Required Sediment Storage (ft³)= **148.76** ft³

Final Required Storage: **148.76** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	5
Final Design Top Length (ft):	10
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	52.50 Too Low
Verify Surface Area (ft ²)	50.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	101 + 50	Elevation Tool (ft)	0
to Sta.:	111 + 38		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **4.000** %
 Contributing
 R/W Width: **35** feet
 Length of Run: **X 988** feet
 Disturbed Area: **= 0.79** acres
 Drainage Area: **0.79** acres

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **13** spaced at **71** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.04000 ft/ft	
V=	533.79 ft ³ /ac/yr	
Required Storage Volume=	423.75 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	33.25 ft
Storage Behind Device (assumes 65% efficiency):	28.67 ft ³
Wrapped TRSC-A/Wattles required:	X 15.0
Total	430.09 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3) and 13 wattles. Devices meet storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.79** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth:

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.79**

Required Sediment Storage (ft³)= **1428.93** ft³

Final Required Storage: **1428.93** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	5
Suggested Top Length (ft):	10
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	106 + 0	Elevation Tool (ft)	0
to Sta.:	111 + 95		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **3.000** %
 Contributing
 R/W Width: **15.5** feet
 Length of Run: **X 595** feet
 Disturbed Area: **= 0.21** acres
 Drainage Area: **0.21** acres
 *Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

Regression Constant, C **549**
 Rainfall Factor, R **135**
 Erodibility Factor, K **0.15**
 Soil Type **EvD Evard, stony**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Table 2-7 (Level III Ref Manual)
 Figure 2-1
 Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **5** spaced at **99** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.03000 ft/ft	
V=	333.52 ft ³ /ac/yr	
Required Storage Volume=	70.61 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	44.33 ft
Storage Behind Device (assumes 65% efficiency):	38.23 ft ³
Wrapped TRSC-A/Wattles required:	2.0
Total	76.46 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(12x6x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, $t_c (A \leq 4.65)$

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.21** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.21**

Required Sediment Storage (ft³)= **381.10** ft³

Final Required Storage: **381.10** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	6
Final Design Top Length (ft):	12
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	72.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	111 + 38	Elevation Tool (ft)	0
to Sta.:	112 + 66		0

Right/Left: **Lt** **No Elev Data** %
 % Ditch Grade: **0.800** %
 Contributing
 R/W Width: **23** feet
 Length of Run **X** **128** feet
 Disturbed Area = **0.07** acres
 Drainage Area: **0.07** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **659** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** *informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **0** spaced at **N/A** feet

Velocity control is not required. The outlet device from Option 4,5, or 6 will be sufficient.

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	659	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.00800 ft/ft	
V=	106.76 ft ³ /ac/yr	
Required Storage Volume=	7.22 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	166.25 ft
Storage Behind Device (assumes 65% efficiency):	110.38 ft ³
Wrapped TRSC-A/Wattles required:	1.0
Total	110.38 ft ³

WATTLES REQUIRED

GOOD. Place measure(s) on EC Plan. Start with the first device as close to the outlet point as possible and then space them evenly up the grade. PAM should not be placed on the last BMP at outlet.

COMMENTS:

Use Sediment dam type b(9x3x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, $A=325Q_p$

a. Determine the Peak Runoff Rate, Q_p ($Q_p = Q_{10}$ (Q_{25} for HQW or Trout))

USE Q25

$Q_p = CIA$

Runoff Coefficient, C **0** Table 1-4, 1-5, 1-6

Time of Concentration, t_c (minutes)

1 **Shortcut Method, $t_c (A \leq 4.65)$**

Watershed Slope, S **0** %

$t_c =$ **N/A** minutes

See Kirpich

2 **Kirpich Method**

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, $t_c =$ **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of

#DIV/0! minutes,

the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/nc_pfds.html

Rainfall Intensity, i (in/hr) **0** in/hr Appendix A

Drainage Area given as **0.07** acres

Peak Rate of Runoff, $Q_p = CIA$ **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: 3

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.07**

Required Sediment Storage (ft³)= **121.65** ft³

Final Required Storage: **121.65** ft³

Proposed Basin Side Slopes: **0.0 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	3
Final Design Top Length (ft):	9
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	2
Verify Storage (ft ³)	81.00 Too Low
Verify Surface Area (ft ²)	27.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	1
Suggested Top Length (ft):	2
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

STEP 1: Input Project Information *Items in red are REQUIRED

Construction time
 ≤ 6 months (Y/N)? **N**
 HQW (Y/N)? **N**
 Trout (Y/N)? **Y**

From Sta.:	111 + 95	Elevation Tool (ft)	0
to Sta.:	112 + 66		0

Right/Left: **Rt** **No Elev Data** %
 % Ditch Grade: **5.000** %
 Contributing
 R/W Width: **40** feet
 Length of Run: **X 71** feet
 Disturbed Area: **= 0.07** acres
 Drainage Area: **0.07** acres

*Drainage Area must equal or exceed the Disturbed Area found above

Surface Dewatering Device **N**
 Is this a Typical Section (Y/N)? **Y**
 Will RUSLE2 be used to model the Non-Typical sections? **N**

County:	Caldwell
Location:	Indian Grave Rd
Prepared By:	Jacob Combs
Date Prepared:	1/15/2016
Level III A #:	3474
Level III A Expiration:	12/31/2016
Reviewed By:	Greg Kirby
Date Reviewed:	1/15/2016
Level III A #:	3498
Level III A Expiration:	12/31/2016

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Version
 2.10.2012

Regression Constant, C **549** Table 2-7 (Level III Ref Manual)
 Rainfall Factor, R **135** Figure 2-1
 Erodibility Factor, K **0.15** Table 2-2 or Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)
 Soil Type **EvD Evard, stony** * informational purposes only.

STEP 2: Ditch Liner requirements: Utilize the Required Liner tab and note recommendations on plans.

STEP 3: Velocity Control Requirements

TYPE B ROCK SILT CHECKS OR WATTLES **1** spaced at **36** feet

Wattles are required in conjunction with PAMS

*See the HELP Tab for additional clarification and an example on how to place on plans.

Start with Option 4A

OPTION 4: Using RUSLE2 Analysis to determine required storage

OPTION 4A: For DRAINAGE AREA < 3 Acre: Use V=CRKs to determine storage

Regression Constant, C	549	} From Step 1 above
Rainfall Factor, R	135	
Erodibility Factor, K	0.15	
Soil Type	EvD Evard, stony	
Ditchline Slope, s	0.05000 ft/ft	
V=	555.86 ft ³ /ac/yr	
Required Storage Volume=	36.24 ft ³	Using maximum Rainfall Factor - Move on to Option 4C

OPTION 4B: For DRAINAGE AREA > 3 Acre: Use RUSLE2 Modeling to determine storage

Sediment Delivery from RUSLE2:	0.00 tons/acre/yr
Converting to ft ³ /ac/yr:	N/A ft ³ /ac/yr
Required Storage Volume=	N/A ft ³

See Option 4A

OPTION 4C: Using the Required Storage Volume from Option 4A or 4B to determine # of Wrapped TRSC-A/Wattles Required

* These devices can be used to satisfy the velocity requirements in Step 3.

Storage from Wrapped Type A Rock Silt Checks or Wattles

Enter Ditch Front Slope Gradient (H:V):	3 :1
Enter Ditch Back Slope Gradient (H:V):	1.5 :1
Enter Device Height:	1.3 ft
Area Behind Device:	3.98 ft ²
Length of Ditch Behind Device:	26.60 ft
Storage Behind Device (assumes 65% efficiency):	22.94 ft ³
Wrapped TRSC-A/Wattles required:	X 2.0
Total	45.88 ft ³

WATTLES REQUIRED

Excessive number of devices required. Go to Option 5

COMMENTS:

Use Sediment dam type b(10x5x3). Device meets storage requirements.

*Designer still has the option of using Option 5 or 6

OPTION 5: IF DRAINAGE AREA > 1 Acre: Use Surface Area Calculations to determine storage, A=325Q_p

a. Determine the Peak Runoff Rate, Q_p (Q_p = Q₁₀ (Q₂₅ for HQW or Trout))

USE Q25

Q_p=CIA

Runoff Coefficient, C **0** Table 1-4,1-5,1-6

Time of Concentration, t_c (minutes)

1 Shortcut Method, t_c (A≤4.6S)

Watershed Slope, S **0** %

t_c= **N/A** minutes

See Kirpich

2 Kirpich Method

Flow Path, L **0** feet

*see Module 1 Eq. 3

Watershed Slope, S **0** ft/ft

*see Module 1 Eq. 3

Kirpich, t_c= **#DIV/0!** minutes

Using a Return Period (T) of 10 yrs (25 for HQW) and a t_c of **#DIV/0!** minutes, the rainfall intensity, i (in/hr), can be read from Appendix A or the NOAA website, http://hdsc.nws.noaa.gov/hdsc/pfds/orb/inc_pfds.html

#DIV/0! minutes,

Rainfall Intensity, i (in/hr) **0** in/hr

Appendix A

Drainage Area given as **0.07** acres

Peak Rate of Runoff, Q_p =CIA **0.00** cfs

b. Determine the Required Surface Area= **0.00** ft²

c. Use Surface Area (A) to determine required **VOLUME** of Temporary Type-B Sediment Dam

Design Depth: **3**

Required **VOLUME** using the design depth: **0.00** ft³

d. Sediment Storage Required using 1800 ft³/ac

Disturbed Area (acres)= **0.07**

Required Sediment Storage (ft³)= **117.36** ft³

Final Required Storage: **117.36** ft³

Proposed Basin Side Slopes: **1.5 :1 side slopes** *must be at least 1.5:1 or flatter

Infiltration Analysis Web Soil Survey (<http://soildatamart.nrcs.usda.gov/>)

Sat. Hydraulic Con. (Ksat, micro m/sec)	0.15
Soil Permeability (in/hr)	0.02
Dewatering Time (Days)	71.4
Basin Design Minimum 2:1 (L:W) Ratio	
Suggested Top Width (ft):	0
Suggested Top Length (ft):	0
Final Design Top Width (ft):	5
Final Design Top Length (ft):	10
Final Design Depth (ft):	3
Weir Width (ft):	4
Skimmer Size (in)	1.5
Orifice Diameter (in)	0.25
Dewatering Time (Days)	1
Verify Storage (ft ³)	52.50 Too Low
Verify Surface Area (ft ²)	50.00 OK

Skimmer Basin Required

Place Basin at outlet point. Ensure devices are used to satisfy requirements of Step 3. Install Baffles*. See Option 6 if installing this measure is not practical.

* **Baffles** are required for infiltration and skimmer basins that are located at drainage turnouts. If the device is greater than 20' in length, it will require 3 baffles. If it is 10'-20' in length, it will require 2 baffles. If it is less than 10', it will require 1 baffle.

OPTION 6: Alternative Designs

IMPORTANT: Before using Option 6, be sure that the information in Step 1 is accurate!

There may be cases where the RUSLE2 Analysis (Option 4) yields an excessive number of devices to achieve storage requirements, and site constraints disallow infiltration and skimmer basin (option 5) installation. Therefore it will be necessary to utilize the option below that best fits your situation. **The 60 Day Option is not available for projects involving HQW or Trout Waters.**

30 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 23% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 30 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 30 day period in NC, the maximum amount of Rainfall Energy that can be expected is 23% of the annual total.

In this situation:

23% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	2
Suggested Top Length (ft):	4
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device. Wattles are required for Trout or HQW waters.**

60 DAY OPTION

Under these circumstances it will be necessary to provide a minimum of 43% of the storage calculated using the RUSLE2 analysis (Option 4) during the Clearing and Grubbing Phase. **This section must then be permanently stabilized within 60 days from the time clearing and grubbing begins.** This is derived from Table 2-1 of the Level III Reference Manual which indicates that for any given 60 day period in NC, the maximum amount of Rainfall Energy that can be expected is 43% of the annual total.

In this situation:

43% of RUSLE2 Required Volume: ft³
 Design Depth (ft):
 Proposed Basin Side Slopes: :1 side slopes

Silt Basin Type B	Minimum 2:1 (L:W) Ratio
Suggested Top Width (ft):	#VALUE!
Suggested Top Length (ft):	#VALUE!
Final Design Top Width (ft):	0
Final Design Top Length (ft):	0
Final Design Depth (ft):	3
Weir Width (ft):	0
Verify Storage (ft ³)	0.00 Too Low

**60 DAY OPTION
DISABLED BECAUSE
OF HQW OR TROUT**

***PAM must be introduced by a minimum of 1 Wrapped Type A Rock Silt Check or Wattle upgrade from this outlet device.**

***Note on the EC Plan whether the 30 or 60 day option is used.**

GENERAL NOTES:

- *If the project involves HQW or Trout Waters, wattles in conjunction with PAM (polyacrylamide) must be installed according to Step 3 and Option 4 above. If Step 3 does not call for velocity control, an additional wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *If the project does **not** involve HQW or Trout Waters, install the Type B Rock Silt Checks (TRSC-B) or wattles according to Step 3 and the Wrapped Type A Rock Silt Checks (TRSC-A) or Wattles according to Option 4. If Option 4 only calls for 1 Wrapped TRSC-A or wattle, an additional Wrapped TRSC-A or wattle will be required up the grade to deliver the PAM during a runoff event. PAM should not be placed on the last BMP at the outlet.
- *Baffles are required for Silt Basin Type B, infiltration and skimmer basins that are located at drainage turnouts.
 - If the device is greater than 20" in length, it will require 3 baffles. If it is 10"-20" in length, it will require 2 baffles.
 - If it is less than 10", it will require 1 baffle.
- *If the Silt Basin Type B, infiltration or skimmer basin can not be installed properly due to the steepness of the ditchline grade, recommend utilizing the Tiered Basin method to ensure sediment storage is achieved.
- *Install a Type A Rock Silt Check or Wattle in conjunction with the Silt Basin Type B, infiltration or skimmer basin.
- *Always show required device and dimensions on EC Plan per spreadsheet. If Option 6 is used, note on the plans if this site must be stabilized within 30 or 60 days from the time clearing and grubbing begins.

COMMENTS:

Temporary Liner (Matting) in Ditchline Calculations (English)

Construction Sheet #	4	5	6	7	8	9	10	11		
Construction Line (-L,-Y-,etc.)	4.1	5.1	6.1	7.2	8.4	9.1	10.3	11.1		
Left or Right (LT.,RT.,Median)	Lt	Lt	Rt	Rt	Rt	Lt	Lt	Lt		
Upper Station No.	1000	2392	3440	4800	6500	7643	8940	10150		
Upper Station Elevation (ft.)										
Lower Station No.	1075	2900	3590	4987	6650	8120	9300	10980		
Lower Station Elevation (ft.)										
Design Ditch Flow Depth (ft.)	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Actual Ditch Depth (ft.)	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33		
Frontslope Grade (i.e. 2 for 2:1)	3	3	3	3	3	3	3	3		
Backslope Grade (i.e. 2 for 2:1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
Base Width (ft., 0 for V-Ditches)	0	0	0	0	0	0	0	0		
Measured Ditchline Length (ft.)	75	508	150	187	150	477	360	988		
Ditch Grade (%)	6.00	7.00	4.00	4.00	3.00	2.00	4.00	4.00	0.00	0.00
Velocity (ft/s)	4.47	4.83	3.65	3.65	3.16	2.58	3.65	3.65	0.00	0.00
Shear Stress in Ditch (lb/ft ²)	1.24	1.44	0.82	0.82	0.62	0.41	0.82	0.82	0.00	0.00
Ditch Liner Requirement	PSRM	PSRM	MATTING	MATTING	MATTING	MATTING	MATTING	MATTING	None	None
Matting Quantity (yd ²)	0	0	110	140	110	350	265	720	0	0
PSRM Matting Quantity (yd ²)	55	370	0	0	0	0	0	0	0	0
Construction Line (-L,-Y-,etc.)	4.3	5.2	6.2	7.3		9.5	10.5	11.3		
Left or Right (LT.,RT.,Median)	Lt	Rt	Lt	Rt		Lt	Lt	Lt		
Upper Station No.	1167	3100	3440	4987		8120	9300	11000		
Upper Station Elevation (ft.)										
Lower Station No.	1400	3440	3800	5450		8522	9709	11128		
Lower Station Elevation (ft.)										
Design Ditch Flow Depth (ft.)	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Actual Ditch Depth (ft.)	1.33	1.33	1.33	1.33		1.33	1.33	1.33		
Frontslope Grade (i.e. 2 for 2:1)	3	3	3	3		3	3	3		
Backslope Grade (i.e. 2 for 2:1)	1.5	1.5	1.5	1.5		1.5	1.5	1.5		
Base Width (ft., 0 for V-Ditches)	0	0	0	0		0	0	0		
Measured Ditchline Length (ft.)	233	340	360	463		402	409	128		
Ditch Grade (%)	7.00	4.00	4.00	3.00	0.00	2.00	4.00	0.80	0.00	0.00
Velocity (ft/s)	4.83	3.65	3.65	3.16	0.00	2.58	3.65	1.63	0.00	0.00
Shear Stress in Ditch (lb/ft ²)	1.44	0.82	0.82	0.62	0.00	0.41	0.82	0.16	0.00	0.00

Ditch Liner Requirement	PSRM	MATTING	MATTING	MATTING	None	MATTING	MATTING	None	None	None
Matting Quantity (yd ²)	0	250	265	340	0	295	300	0	0	0
PSRM Matting Quantity (yd ²)	170	0	0	0	0	0	0	0	0	0
Construction Line (-L-,Y-,etc.)	4.4	5.3	6.3	7.6		9.7	10.8			
Left or Right (LT.,RT.,Median)	Lt	Lt	Rt	Rt		Lt	Lt			
Upper Station No.	1430	3100	3590	5600		8522	9709			
Upper Station Elevation (ft.)										
Lower Station No.	2392	3440	3825	5700		8850	10120			
Lower Station Elevation (ft.)										
Design Ditch Flow Depth (ft.)	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Actual Ditch Depth (ft.)	1.33	1.33	1.33	1.33		1.33	1.33			
Frontslope Grade (i.e. 2 for 2:1)	3	3	3	3		3	3			
Backslope Grade (i.e. 2 for 2:1)	1.5	1.5	1.5	1.5		1.5	1.5			
Base Width (ft., 0 for V-Ditches)	0	0	0	0		0	0			
Measured Ditchline Length (ft.)	962	340	235	100		328	411			
Ditch Grade (%)	7.00	4.00	4.00	5.00	0.00	3.00	4.00	0.00	0.00	0.00
Velocity (ft/s)	4.83	3.65	3.65	4.08	0.00	3.16	3.65	0.00	0.00	0.00
Shear Stress in Ditch (lb/ft ²)	1.44	0.82	0.82	1.03	0.00	0.62	0.82	0.00	0.00	0.00
Ditch Liner Requirement	PSRM	MATTING	MATTING	PSRM	None	MATTING	MATTING	None	None	None
Matting Quantity (yd ²)	0	250	175	0	0	240	300	0	0	0
PSRM Matting Quantity (yd ²)	700	0	0	75	0	0	0	0	0	0
Construction Line (-L-,Y-,etc.)			6.6	7.9			10.9			
Left or Right (LT.,RT.,Median)			Rt	Rt			Rt			
Upper Station No.			3950	5850			10150			
Upper Station Elevation (ft.)										
Lower Station No.			4150	6050			10300			
Lower Station Elevation (ft.)										
Design Ditch Flow Depth (ft.)	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Actual Ditch Depth (ft.)			1.33	1.33			1.33			
Frontslope Grade (i.e. 2 for 2:1)			3	3			3			
Backslope Grade (i.e. 2 for 2:1)			1.5	1.5			1.5			
Base Width (ft., 0 for V-Ditches)			0	0			0			
Measured Ditchline Length (ft.)			200	200			150			
Ditch Grade (%)	0.00	0.00	3.00	4.00	0.00	0.00	3.00	0.00	0.00	0.00
Velocity (ft/s)	0.00	0.00	3.16	3.65	0.00	0.00	3.16	0.00	0.00	0.00

Measured Ditchline Length (ft.)										
Ditch Grade (%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Velocity (ft/s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shear Stress in Ditch (lb/ft ²)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ditch Liner Requirement	None	None	None	None	None	None	None	None	None	None
Matting Quantity (yd ²)	0	0	0	0	0	0	0	0	0	0
PSRM Matting Quantity (yd ²)	0	0	0	0	0	0	0	0	0	0
Total Matting Quantity (yd²) =	0	500	1030	780	110	885	975	720	0	0
Total Ditchline Matting Quantity =	5000.00	yd²								
Total PSRM Quantity (yd²) =	925	370	0	75	0	0	0	0	0	0
Total Ditchline PSRM Quantity =	1370.00	yd²								

TOPO MAP for SR 1513A Indian Grave Rd.

Marker B = BOP Sta 10+00

Marker C = EOP Sta 111+28.29



Saturated Hydraulic Conductivity (Ksat)—Caldwell County, North Carolina
(Indian Graves Ksat)

MAP LEGEND

Area of Interest (AOI)		Transportation	
	Area of Interest (AOI)		Rails
Soils			Interstate Highways
Soil Rating Polygons			US Routes
	<= 4.0860		Major Roads
	> 4.0860 and <= 9.8080		Local Roads
	> 9.8080 and <= 12.1319		Background
	> 12.1319 and <= 25.8970		Aerial Photography
	> 25.8970 and <= 41.6663		
	Not rated or not available		
Soil Rating Lines			
	<= 4.0860		
	> 4.0860 and <= 9.8080		
	> 9.8080 and <= 12.1319		
	> 12.1319 and <= 25.8970		
	> 25.8970 and <= 41.6663		
	Not rated or not available		
Soil Rating Points			
	<= 4.0860		
	> 4.0860 and <= 9.8080		
	> 9.8080 and <= 12.1319		
	> 12.1319 and <= 25.8970		
	> 25.8970 and <= 41.6663		
	Not rated or not available		
Water Features			
	Streams and Canals		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
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: Caldwell County, North Carolina
Survey Area Data: Version 15, Sep 14, 2015

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

Date(s) aerial images were photographed: Oct 22, 2010—Apr 30, 2011

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.

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Caldwell County, North Carolina (NC027)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
AcF	Ashe-Chestnut complex, 50 to 95 percent slopes, very rocky	41.6663	1.1	2.2%
CaF	Chestnut-Ashe complex, 50 to 95 percent slopes, very stony	23.5641	0.3	0.5%
ChF	Chestnut-Buladean complex, 50 to 95 percent slopes, stony	25.8970	17.8	36.4%
CoE	Cowee-Saluda complex, 30 to 50 percent slopes, stony	7.7042	4.1	8.3%
EvD	Evard-Cowee complex, escarpment, 15 to 30 percent slopes, stony	12.1319	1.9	3.9%
EvE	Evard-Cowee complex, escarpment, 30 to 50 percent slopes, stony	12.1319	17.6	36.1%
HeC	Hayesville loam, 8 to 15 percent slopes	2.1000	2.7	5.5%
HeD	Hayesville loam, 15 to 30 percent slopes	2.1000	0.0	0.1%
TaD	Tate fine sandy loam, 8 to 30 percent slopes	4.0860	0.7	1.4%
TfC	Tate-French, occasionally flooded complex, 2 to 10 percent slopes	8.4124	2.0	4.0%
TgD	Tate-Greenlee complex, 15 to 30 percent slopes, very stony	9.8080	0.8	1.6%
Totals for Area of Interest			48.9	100.0%

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 0

Bottom Depth: 36

Units of Measure: Inches

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

Report—RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

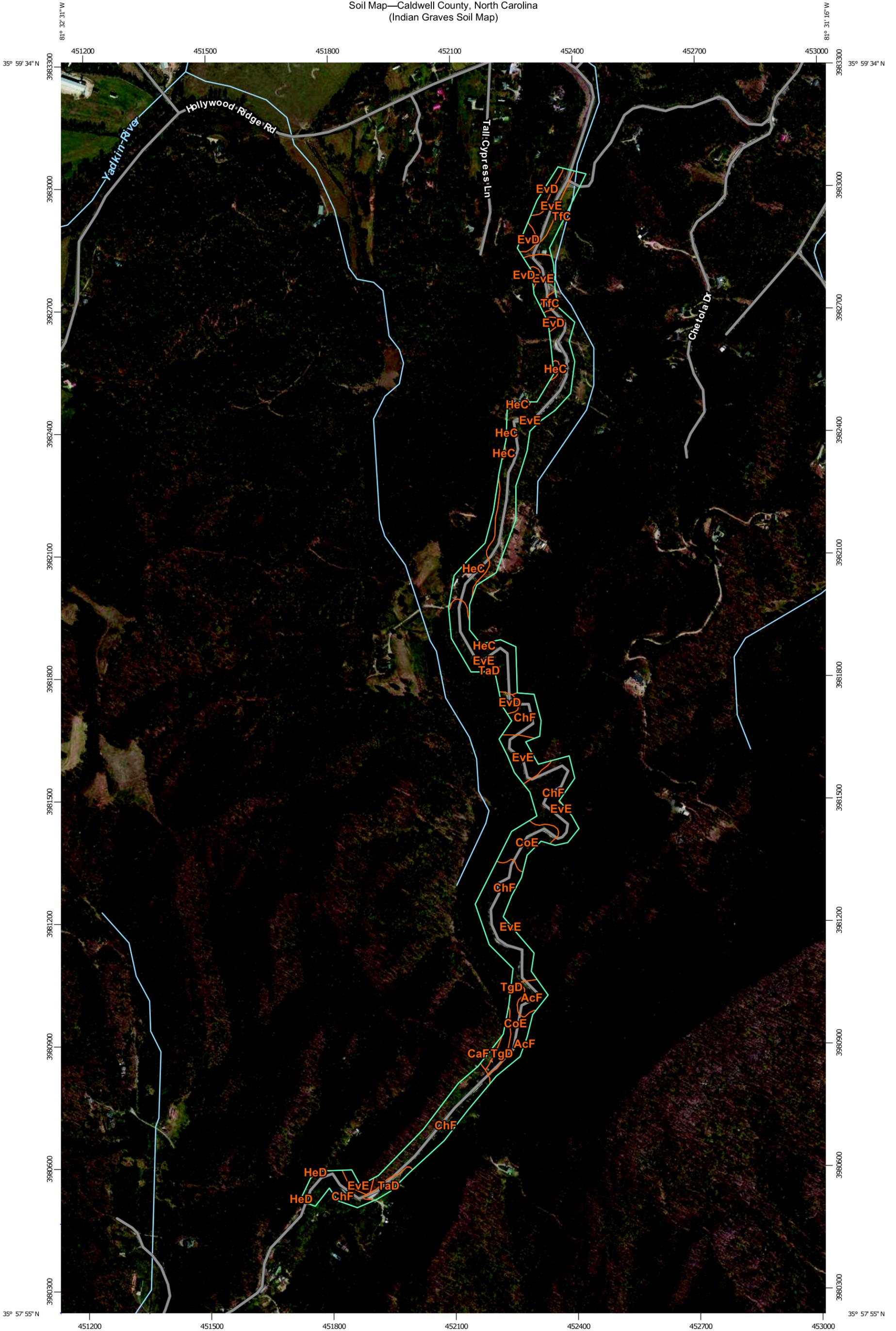
RUSLE2 Related Attributes—Caldwell County, North Carolina								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
AcF—Ashe-Chestnut complex, 50 to 95 percent slopes, very rocky								
Ashe, very rocky	55	—	B	.15	2	70.1	16.4	13.5
Chestnut, very rocky	30	—	B	.17	3	70.9	16.6	12.5
CaF—Chestnut-Ashe complex, 50 to 95 percent slopes, very stony								
Chestnut, very stony	50	—	B	.15	3	67.9	19.6	12.5
Ashe, very stony	35	—	B	.15	2	67.0	19.5	13.5
ChF—Chestnut-Buladean complex, 50 to 95 percent slopes, stony								
Chestnut, stony	45	—	B	.17	3	70.9	16.6	12.5
Buladean, stony	40	—	A	.15	4	68.0	16.0	16.0
CoE—Cowee-Saluda complex, 30 to 50 percent slopes, stony								
Cowee, stony	75	—	C	.20	3	69.6	16.4	14.0
Saluda, stony	15	—	D	.15	2	67.9	19.6	12.5
EvD—Evard-Cowee complex, escarpment, 15 to 30 percent slopes, stony								
Evard, stony	60	49	B	.15	5	69.0	20.0	11.0
Cowee, stony	30	49	C	.15	3	67.0	19.0	14.0

RUSLE2 Related Attributes—Caldwell County, North Carolina								
Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
EvE—Evard-Cowee complex, escarpment, 30 to 50 percent slopes, stony								
Evard, stony	60	49	B	.15	5	69.0	20.0	11.0
Cowee, stony	32	49	C	.15	3	67.0	19.0	14.0
HeC—Hayesville loam, 8 to 15 percent slopes								
Hayesville	90	—	C	.32	5	43.0	39.5	17.5
HeD—Hayesville loam, 15 to 30 percent slopes								
Hayesville	90	—	C	.32	5	43.0	39.5	17.5
TaD—Tate fine sandy loam, 8 to 30 percent slopes								
Tate	80	—	C	.17	5	67.1	17.9	15.0
TfC—Tate-French, occasionally flooded complex, 2 to 10 percent slopes								
Tate	60	—	C	.15	5	65.9	19.1	15.0
French, occasionally flooded	20	—	B/D	.17	3	67.9	19.6	12.5
TgD—Tate-Greenlee complex, 15 to 30 percent slopes, very stony								
Tate, very stony	65	—	C	.15	5	65.9	19.1	15.0
Greenlee, very stony	25	—	A	.10	5	65.9	19.1	15.0

Data Source Information

Soil Survey Area: Caldwell County, North Carolina
Survey Area Data: Version 15, Sep 14, 2015

Soil Map—Caldwell County, North Carolina
(Indian Graves Soil Map)



Map Scale: 1:8,580 if printed on B portrait (11" x 17") sheet.

0 100 200 400 600 Meters

0 400 800 1600 2400 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Soil Map—Caldwell County, North Carolina
(Indian Graves Soil Map)

MAP LEGEND

Area of Interest (AOI)			Spoil Area
	Area of Interest (AOI)		Stony Spot
Soils			Very Stony Spot
	Soil Map Unit Polygons		Wet Spot
	Soil Map Unit Lines		Other
	Soil Map Unit Points		Special Line Features
Special Point Features		Water Features	
	Blowout		Streams and Canals
	Borrow Pit	Transportation	
	Clay Spot		Rails
	Closed Depression		Interstate Highways
	Gravel Pit		US Routes
	Gravelly Spot		Major Roads
	Landfill		Local Roads
	Lava Flow	Background	
	Marsh or swamp		Aerial Photography
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
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.

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Soil Survey Area: Caldwell County, North Carolina
Survey Area Data: Version 15, Sep 14, 2015

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

Date(s) aerial images were photographed: Oct 22, 2010—Apr 30, 2011

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Map Unit Legend

Caldwell County, North Carolina (NC027)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AcF	Ashe-Chestnut complex, 50 to 95 percent slopes, very rocky	1.1	2.2%
CaF	Chestnut-Ashe complex, 50 to 95 percent slopes, very stony	0.3	0.5%
ChF	Chestnut-Buladean complex, 50 to 95 percent slopes, stony	17.8	36.4%
CoE	Cowee-Saluda complex, 30 to 50 percent slopes, stony	4.1	8.3%
EvD	Evard-Cowee complex, escarpment, 15 to 30 percent slopes, stony	1.9	3.9%
EvE	Evard-Cowee complex, escarpment, 30 to 50 percent slopes, stony	17.6	36.1%
HeC	Hayesville loam, 8 to 15 percent slopes	2.7	5.5%
HeD	Hayesville loam, 15 to 30 percent slopes	0.0	0.1%
TaD	Tate fine sandy loam, 8 to 30 percent slopes	0.7	1.4%
TfC	Tate-French, occasionally flooded complex, 2 to 10 percent slopes	2.0	4.0%
TgD	Tate-Greenlee complex, 15 to 30 percent slopes, very stony	0.8	1.6%
Totals for Area of Interest		48.9	100.0%



NOAA Atlas 14, Volume 2, Version 3
Location name: Lenoir, North Carolina, US*
Latitude: 35.9730°, Longitude: -81.5316°
Elevation: 1523 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerials](#)

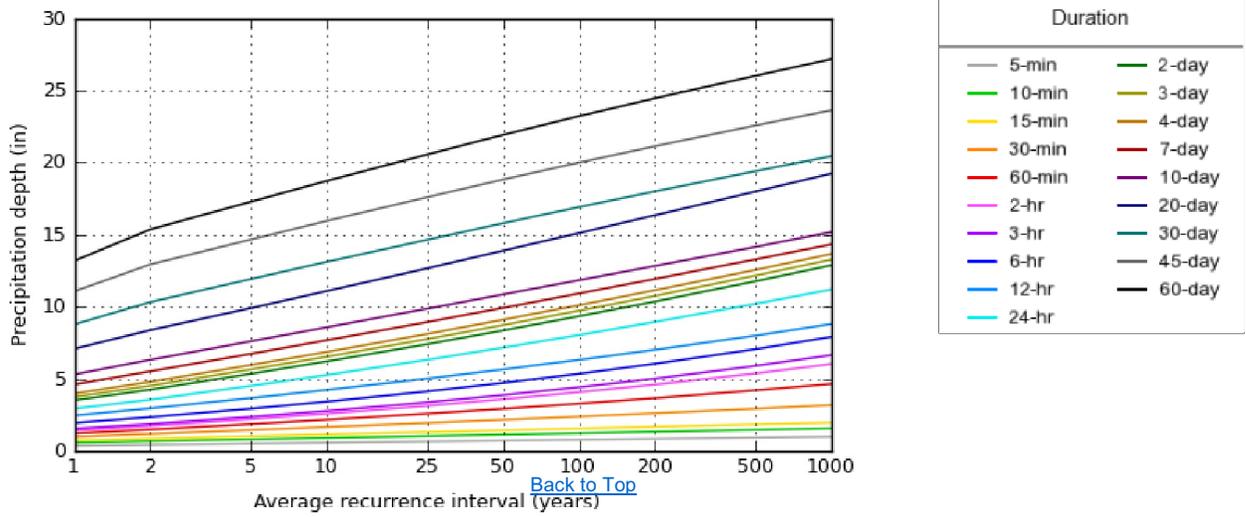
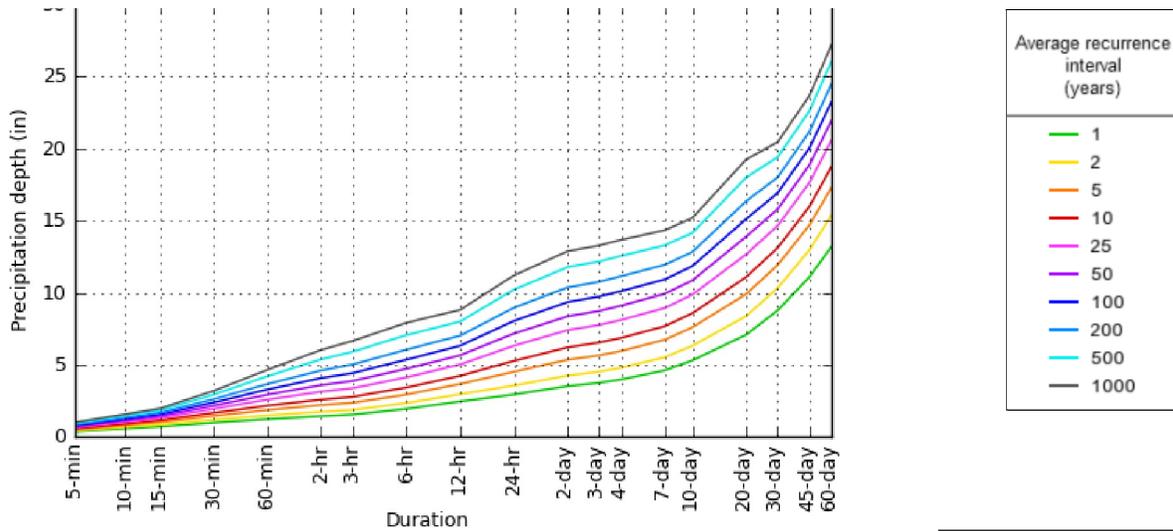
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.358 (0.329-0.392)	0.425 (0.391-0.466)	0.504 (0.461-0.551)	0.567 (0.516-0.620)	0.648 (0.584-0.712)	0.710 (0.633-0.783)	0.774 (0.681-0.859)	0.839 (0.726-0.941)	0.925 (0.782-1.05)	0.994 (0.825-1.14)
10-min	0.572 (0.526-0.627)	0.680 (0.626-0.745)	0.807 (0.739-0.883)	0.906 (0.826-0.991)	1.03 (0.931-1.14)	1.13 (1.01-1.25)	1.23 (1.08-1.37)	1.33 (1.15-1.49)	1.46 (1.24-1.66)	1.57 (1.30-1.80)
15-min	0.715 (0.658-0.783)	0.855 (0.786-0.936)	1.02 (0.934-1.12)	1.15 (1.05-1.25)	1.31 (1.18-1.44)	1.43 (1.28-1.58)	1.56 (1.37-1.73)	1.68 (1.45-1.88)	1.84 (1.56-2.09)	1.97 (1.63-2.26)
30-min	0.981 (0.901-1.07)	1.18 (1.09-1.29)	1.45 (1.33-1.59)	1.66 (1.51-1.82)	1.94 (1.75-2.13)	2.16 (1.92-2.38)	2.38 (2.10-2.64)	2.61 (2.26-2.93)	2.93 (2.48-3.33)	3.18 (2.64-3.66)
60-min	1.22 (1.12-1.34)	1.48 (1.36-1.62)	1.86 (1.70-2.04)	2.16 (1.97-2.37)	2.58 (2.33-2.84)	2.92 (2.61-3.22)	3.28 (2.89-3.64)	3.66 (3.17-4.11)	4.20 (3.56-4.78)	4.65 (3.86-5.35)
2-hr	1.43 (1.31-1.56)	1.74 (1.59-1.90)	2.21 (2.01-2.41)	2.58 (2.34-2.82)	3.13 (2.81-3.43)	3.59 (3.17-3.95)	4.08 (3.56-4.52)	4.60 (3.95-5.16)	5.38 (4.51-6.11)	6.03 (4.95-6.95)
3-hr	1.54 (1.41-1.70)	1.87 (1.71-2.06)	2.36 (2.16-2.60)	2.77 (2.51-3.05)	3.37 (3.02-3.72)	3.88 (3.43-4.31)	4.42 (3.85-4.95)	5.02 (4.30-5.68)	5.90 (4.92-6.79)	6.65 (5.43-7.76)
6-hr	1.94 (1.79-2.12)	2.34 (2.15-2.56)	2.93 (2.69-3.21)	3.42 (3.12-3.74)	4.13 (3.73-4.53)	4.72 (4.22-5.20)	5.35 (4.72-5.95)	6.05 (5.26-6.79)	7.06 (5.98-8.04)	7.91 (6.57-9.13)
12-hr	2.45 (2.27-2.66)	2.96 (2.73-3.21)	3.67 (3.37-3.99)	4.23 (3.88-4.61)	5.02 (4.58-5.48)	5.65 (5.11-6.19)	6.32 (5.65-6.95)	7.02 (6.19-7.78)	8.00 (6.94-8.96)	8.81 (7.53-9.95)
24-hr	2.93 (2.73-3.17)	3.56 (3.31-3.84)	4.51 (4.19-4.87)	5.27 (4.88-5.69)	6.32 (5.82-6.83)	7.16 (6.57-7.75)	8.04 (7.33-8.71)	8.95 (8.11-9.73)	10.2 (9.16-11.1)	11.2 (9.99-12.3)
2-day	3.52 (3.27-3.79)	4.25 (3.95-4.58)	5.35 (4.97-5.76)	6.21 (5.75-6.69)	7.40 (6.81-7.97)	8.36 (7.65-9.01)	9.35 (8.51-10.1)	10.4 (9.38-11.2)	11.8 (10.6-12.8)	12.9 (11.5-14.1)
3-day	3.75 (3.49-4.03)	4.52 (4.21-4.86)	5.65 (5.26-6.08)	6.54 (6.06-7.03)	7.76 (7.16-8.34)	8.73 (8.02-9.40)	9.73 (8.88-10.5)	10.8 (9.77-11.6)	12.2 (11.0-13.2)	13.3 (11.9-14.5)
4-day	3.98 (3.72-4.28)	4.79 (4.48-5.15)	5.96 (5.55-6.39)	6.87 (6.38-7.37)	8.11 (7.50-8.71)	9.10 (8.38-9.80)	10.1 (9.26-10.9)	11.1 (10.2-12.0)	12.6 (11.4-13.6)	13.7 (12.3-14.9)
7-day	4.61 (4.33-4.93)	5.52 (5.19-5.90)	6.73 (6.32-7.19)	7.67 (7.19-8.20)	8.94 (8.34-9.56)	9.92 (9.21-10.6)	10.9 (10.1-11.7)	11.9 (11.0-12.8)	13.3 (12.1-14.4)	14.3 (13.0-15.5)
10-day	5.30 (5.00-5.64)	6.32 (5.96-6.72)	7.60 (7.16-8.09)	8.58 (8.06-9.12)	9.87 (9.24-10.5)	10.9 (10.1-11.6)	11.8 (11.0-12.6)	12.8 (11.9-13.7)	14.2 (13.0-15.2)	15.2 (13.9-16.4)
20-day	7.08 (6.70-7.47)	8.38 (7.92-8.83)	9.90 (9.36-10.4)	11.1 (10.5-11.7)	12.7 (11.9-13.4)	13.9 (13.0-14.7)	15.1 (14.1-16.0)	16.4 (15.2-17.3)	18.0 (16.6-19.2)	19.2 (17.7-20.6)
30-day	8.77 (8.35-9.23)	10.3 (9.82-10.9)	11.9 (11.3-12.5)	13.1 (12.5-13.8)	14.6 (13.9-15.4)	15.8 (14.9-16.7)	16.9 (16.0-17.9)	18.0 (16.9-19.1)	19.4 (18.2-20.6)	20.4 (19.1-21.8)
45-day	11.1 (10.6-11.6)	12.9 (12.3-13.5)	14.7 (14.0-15.3)	16.0 (15.2-16.7)	17.6 (16.7-18.4)	18.8 (17.9-19.7)	20.0 (19.0-21.0)	21.1 (20.0-22.2)	22.6 (21.3-23.8)	23.6 (22.2-25.0)
60-day	13.2 (12.6-13.7)	15.4 (14.7-16.0)	17.3 (16.5-18.0)	18.7 (17.9-19.6)	20.6 (19.6-21.5)	21.9 (20.9-22.9)	23.2 (22.1-24.3)	24.5 (23.2-25.6)	26.0 (24.6-27.4)	27.2 (25.7-28.6)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical



[Back to Top](#)

NOAA Atlas 14, Volume 2, Version 3

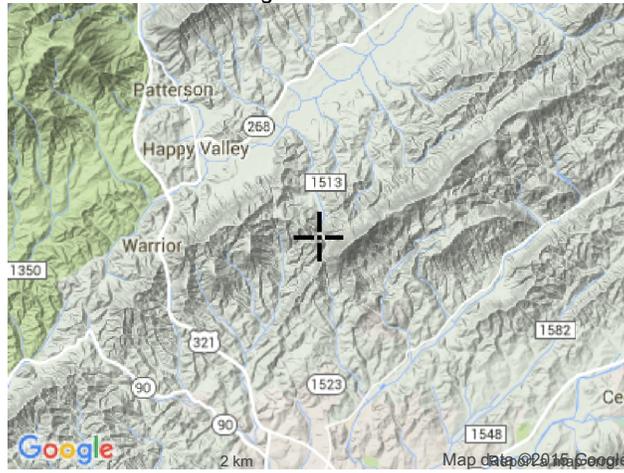
Maps & aerials

Created (GMT): Wed Dec 2 15:40:25 2015

Small scale terrain



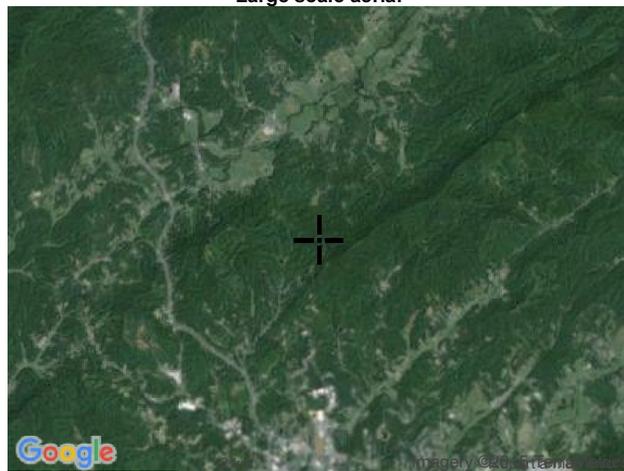
Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
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Questions?: HDSC.Questions@noaa.gov

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