UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY
WATER QUALITY

Buffer Zone Compliance

Presentation Overview

- The “Why” Behind Buffer Zones
- Exemptions, Alternatives, and Equivalency
- RUSLE Examples
- Small Residential Lots
- Mapping, Inspections, and Final Stabilization
- Best Practices

The “Why” Behind Buffer Zones

- A CGP Requirement (Part 2.2.1)
- Protection of Sensitive Aquatic Environments (Elevated Risk – Last Line of Defense)
- Stormwater Accumulation & Discharge Areas
- Vegetative Buffers Are Effective

Compliance Exceptions

- CWA Section 404 and Water-Dependent Structures
- No Stormwater Discharge from Disturbance Area
- Preexisting Development Disturbances
- Linear Construction Projects with Site Constraints
- Small Residential Lot Compliance Alternatives

Note: Must be documented in the SWPPP.

Compliance Alternatives

Full 50-Foot Natural Buffer

Reduced Natural Buffer + Supplemental Controls

Engineered Sediment Controls Alone

Sediment Removal Efficiency (SRE)

Achieve It!

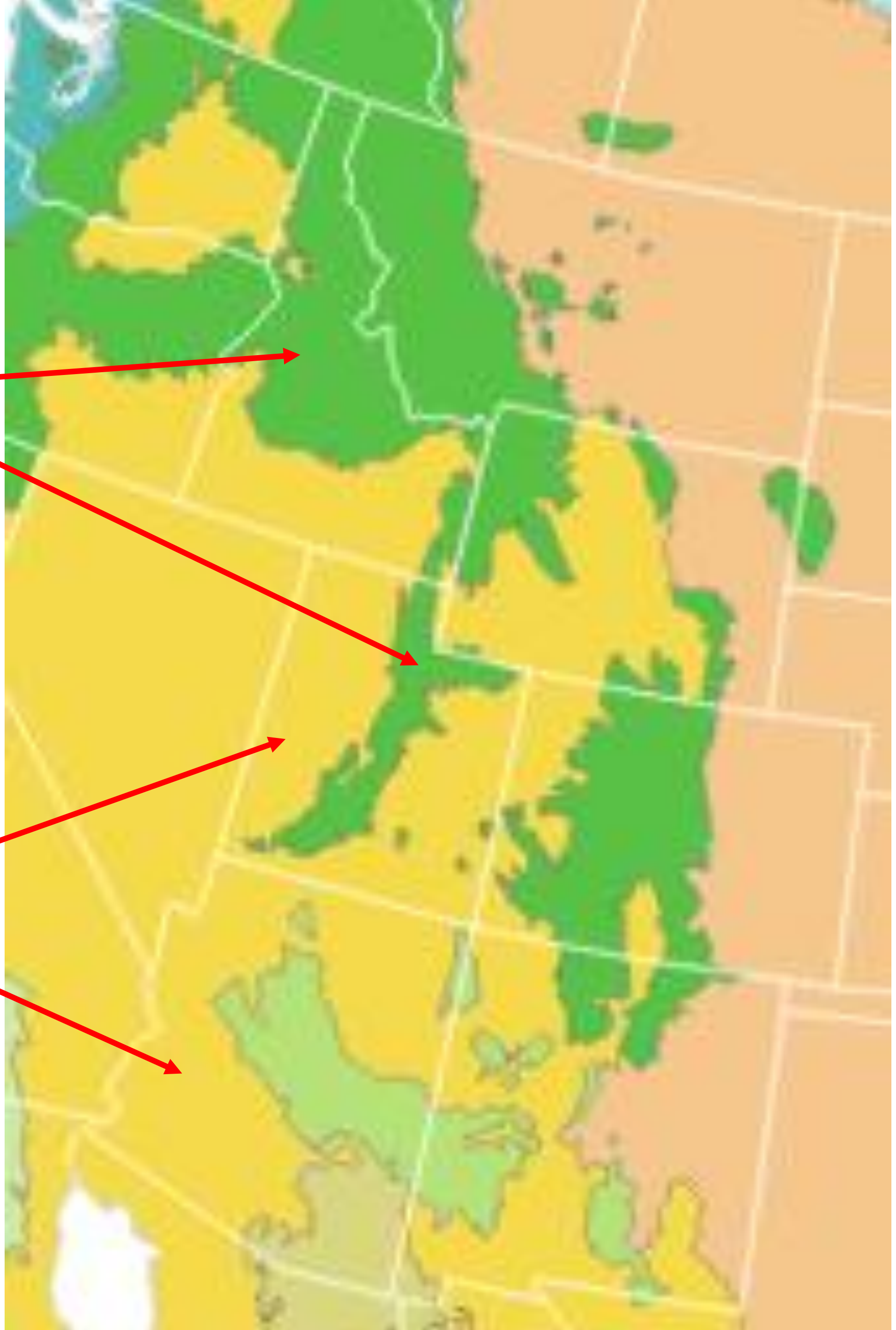
Document It!

Sustain It!

Performance Tables: Key Considerations

- Assumes uniform topography and removal of vegetation.
- Based on <9% slope and 100-foot slope length.
- Perimeter controls are mandatory, and function as part of the sediment removal efficiency.
- Due to variability in soil, slope, and vegetation professional judgment is required to select the best performance standard for your site.

50-Buffer Performance in Idaho “Northern Utah” = Green Ecoregion (Northwest Forested Mountains)



50-Buffer Performance in New Mexico “Southern Utah” = Yellow Ecoregion (North American Deserts)

Calculating Equivalency (Alternative 2 & 3)

- **Step 1 – SRE Performance Equivalency Standard**
  - Identify site/buffer characteristics; vegetation, soil type, and slope (%)
  - Reference Tables A-8 & A-9 and document 50-foot buffer efficiency
  - >9% slope/100 ft., calculate site-specific equivalency standard

Table A-8 Estimated 50-foot Buffer Performance in Idaho* (Northern Utah)

Type of Buffer Vegetation**	Estimated % Sediment Removal				
	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Tall Fescue Grass	42	52	44	48	85
Medium-density Weeds	28	30	28	26	60
Low-density Warm-season Native Bunchgrass (i.e., Grama Grass)	25	26	24	24	55
Northern Mixed Prairie Grass	28	30	28	26	50
Northern Range Cold Desert Shrubs	28	28	24	26	50

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table A-9 Estimated 50-foot Buffer Performance in New Mexico* (Southern Utah)

Type of Buffer Vegetation**	Estimated % Sediment Removal				
	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Tall Fescue Grass	71	85	80	86	90
Medium-Density Weeds	56	73	55	66	78
Low-Density Warm-Season Native Bunchgrass (i.e., Grama Grass)	53	70	51	62	67
Southern Mixed Prairie Grass	53	71	52	63	50
Southern Range Cold Desert Shrubs	56	73	55	65	53

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

The True Measure of Protection

- **Natural Buffer Performance is Region-Specific**
  - The compliance target is defined by what a naturally functioning 50-ft buffer would achieve under local conditions.
  - This means that in regions where nature “works well,” your engineered controls must provide a comparable level of protection, even if that requires extra measures.
- **Implications For Alternative Control Measures**
  - In arid regions, infrequent rainfall and favorable soil conditions lead to lower overall sediment production, so it “works well”.
  - In wetter regions with frequent, intense rainfall, natural buffers typically achieve lower sediment removal efficiencies.

Calculating Equivalency (Alternative 2 & 3)

- **Step 2 – Achieving Equivalency & Documentation**
  - Select appropriate erosion/sediment controls
  - Model and evaluate (≥ Performance Standard)
  - Meet specifications and keep in effective operating condition
  - Include all calculations, data sources, assumptions, and model outputs
  - Demonstrate through a side-by-side comparison

RUSLE Factors

- **A (tons/acre/year; soil loss) = R K LS C P**
  - R= Rainfall-runoff erosivity factor
  - K= Soil erodibility factor
  - LS= Slope length/steepness factor
  - C= Cover management factor
  - P= Supporting practices factor

Table A-8 Estimated 50-foot Buffer Performance in Idaho* (Northern Utah)

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* Applicable for sites with less than nine percent slope

** Characterization focuses on the under-story vegetation

Achieving Equivalent Sediment Removal Efficiency (RUSLE)

Example 1 – Northern Utah

(Medium Density Weeds + Silty Clay Loam) (**30%** SRE Standard)

Assumptions:

Rainfall Erosivity (R) = 20

Soil erodibility (K) = 0.40 (higher clay content)

Slope factor (LS) = 0.75 (9% slope over 100 ft)

Cover factor (C) = 1.0 (bare soil, no buffer)

Supporting factor (P) = 1.0 (no BMPs)

Calculations:

Baseline Soil Loss: Step 1

$A\_{baseline} = 20 \times 0.40 \times 0.75 \times 1.0 \times 1.0 = 6.0$ tons/acre/year

With One Silt Fence (P = 0.60): Step 2

$A\_{control} = 20 \times 0.40 \times 0.75 \times 1.0 \times \mathbf{0.60} = 3.6$ tons/acre/year

Sediment Removal Efficiency:

$(6.0 - 3.6) / 6.0 \times 100\% =$ **40%**

Interpretation: 40% SRE ≥ 30% SRE ✓

Table A-9 Estimated 50-foot Buffer Performance in New Mexico* (Southern Utah)

Type of Buffer Vegetation **	Estimated % Sediment Removal				
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Southern Range Cold Desert Shrubs	56	73	55	65	53

* Applicable for sites with less than nine percent slope

** Characterization focuses on the under-story vegetation

Achieving Equivalent Sediment Removal Efficiency (RUSLE)

Example 2 – Southern Utah

(Medium Density Weeds + Sandy Clay Loam) (**66%** SRE Standard)

Assumptions:

Rainfall Erosivity (R) = 12

Soil erodibility (K) = 0.25 (higher sand content)

Slope factor (LS) = 0.75 (9% slope over 100 ft)

Cover factor (C) = 1.0 (bare soil, no buffer)

Supporting factor (P) = 1.0 (no BMPs)

Calculations:

Baseline Loss:

A_*baseline* = 12 × 0.25 × 0.75 × 1.0 × 1.0 = 2.25 tons/acre/year

Two Silt Fence Layers (Combined P = 0.36):

A_*control* = 12 × 0.25 × 0.75 × 1.0 × **0.36** = 0.81 tons/acre/year

Sediment Removal Efficiency:

(2.25 – 0.81) / 2.25 × 100% = **64%**

Interpretation: 64% SRE ≤ 66% SRE ✗

Manufacturer's Specifications Example

- Documentation is clear in the SWPPP, referencing the specific source of the SRE figure and explaining why it applies to the project’s conditions.
- Credibly documented (e.g., via manufacturer specs or a recognized study)
- Site conditions match the assumptions or conditions under which the SRE was established (e.g., slope, soil type, flow rate).
- Determine if the published SRE data is directly applicable to the site, and it effectively surpasses the removal standard of the 50-foot buffer.
- If there is any doubt, such as different soil conditions or slopes, RUSLE or another model might be needed to confirm SRE.

Small Residential Lot Compliance Alternative

- **Option 1** - Implement the controls specified in Table A-1 based on the buffer width to be retained.

Table A-1 Alternative 1 Requirements[43]

Retain 50-foot Buffer	Retain <50 and >30 Buffer	Retain ≤ 30-foot buffer
No Additional Requirements	Double Perimeter Controls	Double Perimeter Controls and 7-Day Site Stabilization

Note: See footnote 48

Small Residential Lot Compliance Alternative

- **Option 2** - Implement based on both the buffer width retained and the site's sediment discharge risk.
- **Step 1** – Determine Site's Sediment Risk Level (Table's A-2 to A-6)

Table A-2 Risk Levels for Sites with Average Slopes of ≤ 3 Percent

Location \ Soil Type	Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Idaho (Northern Utah)	Low	Low	Low	Low	Low
New Mexico (Southern Utah)	Low	Low	Low	Low	Low

Small Residential Lot Compliance Alternative

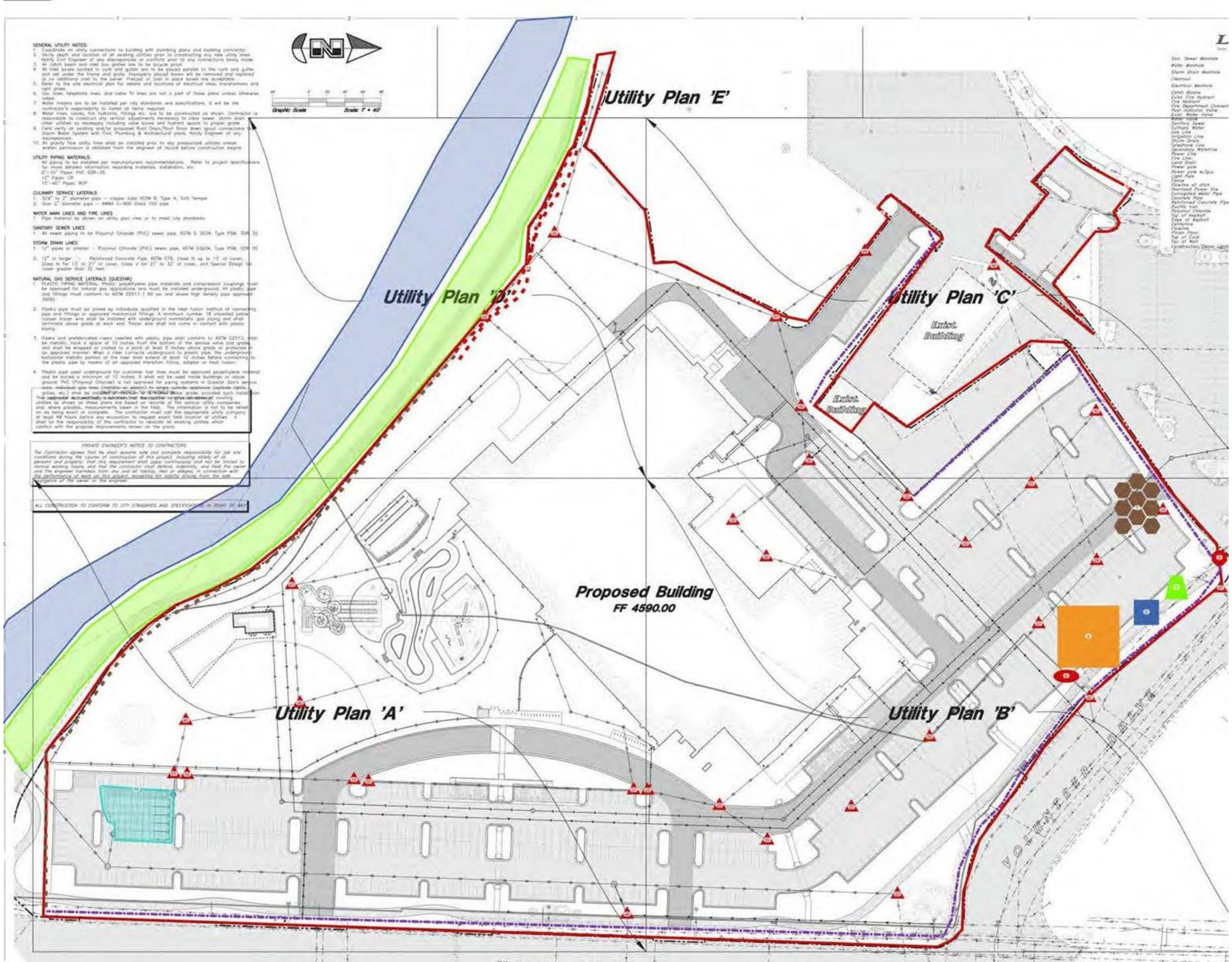
- **Step 2** – Determine Which Controls Apply (Table A-7)

Table A-7. Alternative 2 Requirements

Risk Level Based on Estimated Soil Erosion	Retain ≥ 50' Buffer	Retain < 50' and > 30' Buffer	Retain ≤ 30' and >10' Buffer	Retain ≤ 10' Buffer
Low Risk	No Additional Requirements	No Additional Requirements	Double Perimeter Control	Double Perimeter Control
Moderate Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization
High Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization	Double Perimeter Control and 7-Day Site Stabilization

SWPPP Mapping Requirements

- **CGP Part 7.3.3**
  - (b) Locations of all waters of the state…
  - (e) Drainage patterns of storm water...
  - (f) Locations where storm water will discharge directly to waters of the state.
  - (h) Locations of storm water controls, including natural buffer areas…
- **Appendix A**
  - …you must also show any buffers on your site map…
  - How wide are your buffers?


Utility Plan 'E'
Utility Plan 'D'
Utility Plan 'C'
Exist. Building
Exist. Building
Proposed Building
FF 4590.00
Utility Plan 'A'
Utility Plan 'B'
GENERAL UTILITY NOTES:
UTILITY PIPING MATERIALS:
CULINARY SERVICE LATERALS
WATER MAIN LINES AND FIRE LINES
SANITARY SEWER LINES
STORM DRAIN LINES
NATURAL GAS SERVICE LATERALS (QUESTAR)
PRIVATE ENGINEER'S NOTICE TO CONTRACTORS
ALL CONSTRUCTION TO CONFORM TO CITY STANDARDS AND SPECIFICATIONS

Inspections – Your Onsite Reality Check

- **Pre-Construction Inspections**
  - Are buffer zones delineated, and clearly marked off?
  - Verify baseline conditions – vegetation, soil type, slope?
  - Conduct walkthrough with operator. Does design intent translate to field conditions?
- **Active Site Inspections**
  - Are BMPs installed per manufacturer specifications?
  - Are discharges treated by erosion controls before reaching buffers?
  - Does the actual setup align with planned location on site map?
  - Record observations and immediately address any discrepancies.
  - Immediate or Imminent threat? HB220

Final Stabilization

- **Stabilization is a Continuous Process**
  - Not just an "end-of-project" step – As soon as practicable!
  - Stabilization Window: Initiate within 30 days – Finish within 30 days
- **Stabilization Controls**
  - Temporary vs. Permanent
  - Vegetative (seeding, hydroseeding, sod) and non-vegetative (mulch, erosion control blankets, riprap)
  - Inspect regularly—check for erosion, sediment deposition, staining, slope failure, or debris accumulation.
  - **Non-Arid:** Achieve ≥70% of pre-disturbance vegetation cover; **Arid/Semi-Arid:** Plan for 70% cover within three years.

Best Practices for Compliance

- **Operators:**
  - Clear and Thorough Documentation
  - Must Be Site-Specific
  - Use “Qualified” Individual
  - “Stack” BMPs – Create a Treatment Train
  - Do Not Enter 50-foot buffer!
  - Train and Communicate – Don’t treat your bulldozer like a joyride!

Best Practices for Compliance

- **Oversight Inspectors:**
  - Expectation is Verification
  - Communicate Early (Pre-Con Meeting)
  - Ask for help! – Staff Engineer, other MS4s, Coalition
  - Ensure Protected Before Disturbance
  - Communication and Feedback

Resources - RUSLE

- **R Factor (Rainfall Erosivity)**
  - EPA Rainfall Erosivity Factor Calculator: Rainfall Erosivity Factor Calculator | US EPA

- **K Factor (Soil Erodibility)**
  - USDA Web Soil Survey provides detailed soil texture and erodibility data: USDA Web Soil Survey

- **LS Factor (Slope Length and Steepness)**
  - MSU Institute of Water Research online soil erosion assessment tool: RUSLE - an online soil erosion assessment tool

Resources - RUSLE

- **C Factor (Cover Management):**

Study by Kelsey and Johnson *Determining Cover Management Values (C Factors) for Surface Cover Best Management Practices (BMPs):* DETERMINING COVER MANAGEMENT VALUES (C FACTORS) FOR SURFACE COVER BEST MANAGEMENT PRACTICES (BMPs)

- **P Factor (Supporting Practices):**

Data is scarce, but several performance tables indicate that silt fences and straw wattles typically achieve effective P factors between 0.50 and 0.60, corresponding to approximately 40–50% sediment removal efficiency. Mississippi DEQ Erosion Control Manual: Appendix A: Erosion and Stormwater Runoff Calculations