

Quantifying Support Practice Factor Values for Sediment Retention Devices Using WEPP

A Thesis Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

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December 2022

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*To my father,
Thank you for teaching me to shine bright.*

Acknowledgments

I would like to thank my primary advisor, Dr. Hathaway, for all of his opportunities, mentorship, and guidance along the way.

I would also like to thank my advisors, Dr. Schwartz and Dr. Wilson, for all their aid on my project. For the millions of questions answered, the assistance in data analysis, and the extensive guidance provided, I could never thank them enough.

Additionally, I would like to thank my parents for all the opportunities they afforded me growing up, from all the home science experiments and educational camps to their simple aid and support in homework and projects throughout the years. These afforded opportunities gave me a love for STEM and pushed me to pursue my passions. I will never be able to thank them enough for all that they have done for me to reach this achievement.

Lastly, a special thanks to my husband Daniel. I would like to thank him for being there when I was lost and did not know the way and for being understanding through all the late nights, lack of weekends, and endless rants.

Abstract

Sediment is the most prevalent pollutant in waterways in the United States. Construction sites and roadways have both been identified as considerable contributors to sediment pollution, as they experience 10 to 20 times more soil loss than agricultural sites; however, this erosion can be mitigated through the utilization of best management practices, including erosion prevention and sediment control devices. An estimation of soil erosion can be determined empirically through the revised universal soil loss equation (RUSLE), the industry standard, or via a deterministic model, the water erosion prevention project (WEPP), to determine the optimal sediment control device to employ. Due to RUSLE's empirical nature, limitations are created because of its reliance on field observations and physical experimentation to determine the correction factors; however, WEPP can simulate models representing these physical experiments to determine these same factors. In this study, WEPP was used to determine the highly debated erosion control practices factor (P-factor) for RUSLE. A variety of different parameters influence the efficiency of these sediment control devices, including drainage area, climate, soil types, topography, and land use/cover. This study focused on a combination of five common soil types (clay loam, silt clay loam, silt clay, silt loam, and loam) and four climate regions (Knoxville, Nashville, Chattanooga, and Memphis) in Tennessee to generate P-factors for silt fences and straw-filled sediment tubes. The study was performed by generating and calibrating a hillslope model, performing numerical simulations for a generated watershed, and determining and analyzing the P-factor. While no significant fluctuations of the P-factor for the different climate regions were found, there were significant differences for the soil type. The soil type was concluded to have the greatest influence on the efficiency of these sediment control devices due to variations in soil composition and

hydraulic conductivity. The soil type with the greatest efficiency was silt clay loam ($P = 0.34$ for silt fences), while silt loam produced the least level of reduction ($P = 0.55$ for straw-filled sediment tubes). Both tables and regression equations were created to model the P-factor for each combination of climate and soil type.

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Chapter 1

Introduction

Soil erosion has a cascading effect on a system's environmental health. Although soil erosion generates a complex web of effects, the basics of soil erosion is founded on a simple mechanistic process that can be easily observed and analyzed. This process consists of the following three steps: detachment, transport, and deposition [26]. A systematic analysis of this process provides a deeper comprehension of the vast effects that soil erosion can have on the environment. The loss of soil from the detachment phase can significantly reduce the fertility of the land by removing nutrient rich topsoil essential for vegetative growth [20].

Once the soil has been dislodged, it is often transported off-site [38]. The transported soil travels suspended in the water column of nearby streams, lakes, and estuaries where it eventually deposits and accumulates [20, 38]. The Clean Waters Acts (CWA) concluded that sediment is the most common pollutant present in waterways [22]. The significant presence of the eroded sediment in these waterways has been linked to the degradation of the overall water quality. Once the sediment is suspended into these waterways, the water quality is drastically impacted by increasing both the turbidity and temperature. Along with these fluctuations, the suspended particles will negatively influence both the respiration and digestion of aquatic organisms [38]. Over time, these suspended sediment particles will settle and be deposited onto the banks or bed of the waterbody. The deposition of these soil particles can lead to an increase of flooding, along with a decrease in navigability of the waterway [38].

To prevent these negative consequences properly, it is essential to recognize the primary areas from which the soil erosion is occurring. Soil erosion can arise on a variety of different lands; however, construction sites and roadways are a substantial point source for sediment pollution as the bare and reworked soil is susceptible to runoff-driven erosion. These sites can contribute 10 to 20 times more soil loss than agricultural lands [12]. Construction sites have been cleared of all vegetation and often have had their topsoil disturbed. The lack of cover leads to the soil being easily detached and transported, resulting in these high erosion rates. The amount of sediment that is able to be transported off-site can be mitigated through the implementation of best management practices.

Best management practices (BMPs) are a variety of different practices that have the capability of treating, preventing, and reducing the amount of soil that enters surrounding waterways [22]. Due to the significant erosion rates that are often observed on construction sites and the vast array of negative impacts sediment pollution has on the environment, the United States government mandated the containment of soil eroded from any site. The National Pollutant Discharge Elimination System (NPDES) Phase II specifically dictates these sites achieve a reduction in erosion by implementing sediment control best management practices [13]. A variety of devices can be utilized for sediment control, such as silt fences and straw-filled sediment tubes.

Erosion is influenced by a variety of factors, and because it varies on a case-to-case basis, it is difficult to know the best measures to take in order to mitigate it. The best way to combat this is to estimate erosion using a model that attempts to represent the conditions of a given site. An awareness of the gross soil erosion can be found using the revised universal soil loss equation (RUSLE). Utilized by both researchers and organizations, such as the Tennessee Department of Transportation (TDOT), RUSLE is the current most widely accepted tool to determine the gross soil erosion of an area [8]. RUSLE is an empirical model composed of five factors that are multiplied together to calculate the gross soil erosion, and if the appropriate values are known to simulate the given conditions, the model has a high degree of accuracy [37]. The erosion control practices factor represents the effectiveness of a given erosion prevention or sediment control device at retaining eroded soil [37]. Many studies

have been conducted to determine the efficiency of these erosion prevention and sediment control devices by employing RUSLE [11, 18, 35, 37]. Through an analysis of these various studies, it is apparent that the efficiency of these sediment control devices can vary greatly from experiment to experiment. The irregularities of these efficiencies can be correlated to the differences in the experimental set-up and a lack of previously established factors to appropriately model a given area [11]. One such example of this is a lack of defined reduction efficiencies of these erosion prevention and sediment control devices for the state of Tennessee [31]. This absence of data resulted in TDOT funding the University of Tennessee to perform a study to analyze the efficiency of these different practices in a controlled and uniform experimental set-up [39]. The efficiency of three differing sediment control devices (silt fences, straw-filled tubes, and mulch-filled tubes) was determined for three different rainfall intensities. Although this experiment determined the efficiency for these specific sediment control devices, it has been observed that a variety of different parameters influence the total efficiency of erosion prevention and sediment control devices, including drainage area, climate, soil types, topography, and land use/cover [32, 39].

A restriction of utilizing RUSLE to determine these reduction efficiencies is a reliance on physical experiments to be conducted, and due to constraints with funding, the time it takes to collect ample data, and the availability of researchers, the amount of data available for these various parameters is greatly limited. Another method of accurately simulating the net soil lost from these construction sites is the Water Erosion Prediction Project (WEPP) [24, 25]. WEPP is a mechanistic model that can be used to isolate a few key variables while holding the rest of the system in a known state [3]. In this study, the experiments of the previous study will be modeled using WEPP to isolate factors that influence the effectiveness of the erosion control practices used in that study. The key differences between these two methods of estimating sediment erosion, WEPP and RUSLE, can be found in [Chapter 2](#). Through the analysis of these key differences, gaps in knowledge were found and objectives were determined for a new study. The objectives of this study can be found in [Chapter 3](#).

Chapter 2

Background

2.1 Revised Universal Soil Loss Equation

The revised soil loss equation, RUSLE, is a widely accepted and utilized method to determine empirically the gross soil erosion of an area. RUSLE can be seen in [Equation 2.1](#) where A is computed soil loss, R is the rainfall-runoff erosivity factor, K is the soil erodibility factor, LS is the slope length and steepness factor, C is the cover management factor, and P is the erosion control practices [\[37\]](#). As a result of the empirical nature of RUSLE these factors are calculated through observations found in the field or through conducted experiments.

$$A = R \cdot K \cdot LS \cdot C \cdot P \quad (2.1)$$

RUSLE is a critical planning tool utilized to ensure the conservation of soil because of its ease of use [\[29\]](#). Due to its widespread usage, the replicability of the estimated soil erosion is essential; however, a debated component of RUSLE is the P component due to the large variability that has been observed in literature [\[11, 18, 35, 37\]](#).. The method of calculating the erosion control practice factor (P-factor) can be seen in [Equation 2.2](#) [\[37\]](#). The P-factor of RUSLE ranges between 0 and 1 where a lower number indicates a greater efficiency for the erosion control practice in question.

$$P = \frac{A_{\text{with practice}}}{A_{\text{without practice}}} \quad (2.2)$$

The P-factors found in literature vary greatly across a variety of erosion prevention and sediment control devices. For silt fences, the P-factor has been found to range from 0.11 to 0.77 [11, 18]. One study achieved substantial reductions in soil loss using silt fences, producing P-factors that ranged from 0.11 to 0.29 [11]. This level of reduction efficiency is substantially greater than that found for several other studies in literature. The studies conducted by Fifield [15] and Gogo-Abite et al. [18] found similar soil loss ratios of 0.6 and 0.44 to 0.77, respectively. Theisen et al. [35] was able to achieve a P-factor as low as 0.12; however, unlike the study conducted by Faucette et al. [11], this study found a wider range of 0.12 to 0.58 for the observed P-factors. Although the range of P-factors is substantial for silt fences, the range for straw-filled sediment control devices is even greater. The study conducted by García et al. [16] was found to experience a very large range of 0.03 to 0.81 for the P-factors. Other studies achieved better and more uniform results. Studies conducted by Faucette et al. [11], Kelsey et al. [23], and Theisen et al. [35] were observed to have similar P-factor ranges of 0.10 to 0.32, 0.29 to 0.45, and 0.14 to 0.51, respectively. Through the lack of a consensus on the ideal value for the P-factor, a large amount of variability can occur for the amount of soil loss estimated by RUSLE.

One such explanation for the variability in observed P-factors is the differences in the experimental parameters. The P-factor can be influenced by a variety of landscape and ecological conditions [32]. The parameters that directly impact the efficiency of these control devices include drainage area, climate, soil types, topography, and land use/cover [39]. These parameters influence the amount of erosion that an area will experience because they change the physical environment. These parameters will manipulate the amount of runoff, the peak runoff rate, the frequency and duration for which runoff will be expected, and the capability for runoff to properly infiltrate. Previously conducted studies have found that the amount of runoff a site experiences is directly correlated to the amount of soil that will be eroded [39]. It is crucial to understand how each one of these parameters can contribute to erosion.

2.2 Previously Performed Works

A study conducted at the University of Tennessee - Knoxville (UTK) for TDOT focused on measuring P-factors for environments found in the state of Tennessee to utilize in RUSLE [39]. This previous work evaluated the P-factor for three sediment control devices: silt fences, straw-filled sediment tubes, and mulch-filled sediment tubes. A systematic approach was performed using an intermediate-sized, physical lab model of a roadcut that followed the National Transportation Product Evaluation Program (NTPEP) guidelines and standard practice TM11340. The physical model was scaled so that controlled conditions and repeatable methods would provide consistent and reasonable erosion estimates [42]. The scaled-down model was designed to the specifications illustrated in Figure 2.1 and stated in Table 2.1.

Four sets of experiments were performed to determine the P-factor for various sediment control devices. During each set of experiments, soil from different regions in Tennessee was placed in the physical model and compacted to 95% of the Proctor density. Rainfall with three different intensities was applied to the soil for 20 minutes. The sediment-laden runoff was collected in its entirety for determining the total amount of runoff and eroded soil generated during the applied event. The first set of experiments consisted of bare soil without any sediment control devices. These tests were conducted to determine a baseline erosion rate. The three remaining sets of experiments used the same bare soil, but each incorporated a different sediment control device. The three sediment control devices included in this study were silt fences, straw-filled sediment tubes, and mulch-filled sediment tubes. The P-factors for each of the sediment control devices were then determined by comparing the baseline erosion to the erosion found for each of the different sediment control devices, and they were found to have a range of 0.03 and 0.76 [39].

The different rainfall intensities (Table 2.1) were produced using Norton Ladder Multiple Intensity Rainfall Simulators. The three varying intensities were based on the Rainfall intensity-duration-frequency curves for the regions of Tennessee to ensure they were representative of the climate experienced throughout the state. The corresponding recurrence intervals to the NTPEP testing is shown in Table 2.2.

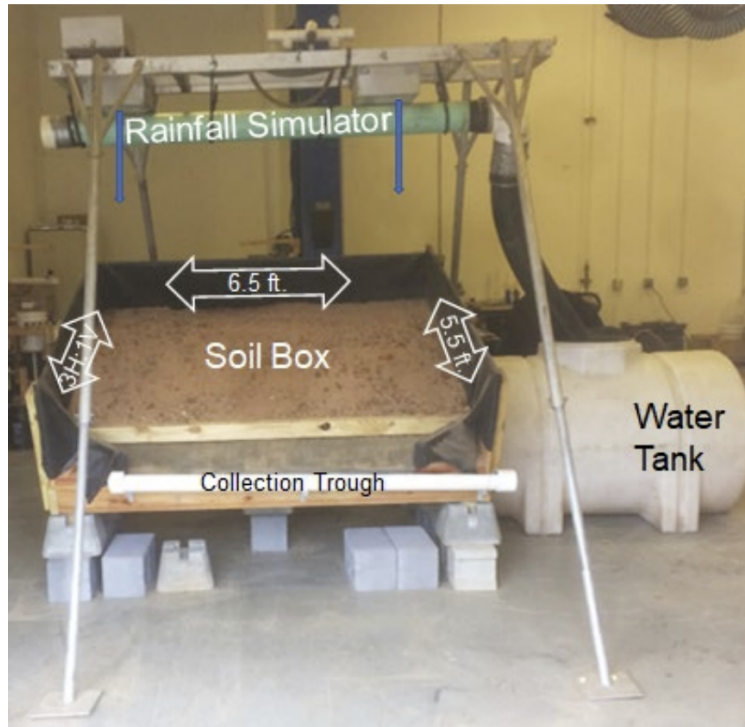


Figure 2.1: Physical Lab Model [39]

Table 2.1: Overview of Physical Lab Scale Model

Experimental Setup	
Hillslope	6 ft x 6 ft
Uniform Slope	3H:1V
Management	Bare
Climate	Single Storm
Duration (min)	20
	2.31
Intensity (in/hr)	3.29
	4.1

Table 2.2: Corresponding recurrence intervals to the NTPEP testing [39]

Region	2 in/ hr	4 in / hr	6 in/hr
Knoxville	10 yr - 60 min	50 yr - 30 min	100 yr - 15 min
Chattanooga	5 yr - 60 min	25 yr - 30 min	100 yr - 15 min
Nashville	7 yr - 60 min	40 yr - 30 min	100 yr - 15 min
Memphis	5 yr - 60 min	25 yr - 30 min	100 yr - 15 min

Regarding the different soils used in the physical model, they were representative of the main soil textures found in Tennessee. These different soil textures were determined by conducting a survey of the state utilizing the soil survey maps developed by the Natural Resources Conservation Service. The selected soil textures along with the corresponding composition and properties for both studies are shown in [Table 2.3](#). Through the survey, it was discovered that the predominant soil texture found in Tennessee was silt loams.

2.3 Water Erosion Prevention Project

Another method that can accurately simulate the net soil lost from these construction sites is the Water Erosion Prediction Project (WEPP) model [\[25\]](#). Both WEPP and RUSLE were developed in response to the shortcomings of the universal soil loss equation (USLE) [\[24\]](#). Although WEPP and RUSLE both estimate the amount of soil loss for a defined area, these two methods determine these rates through differing processes. As stated in [Section 2.1](#), RUSLE is an empirical model that relies on physically determined correction factors. In contrast, WEPP is a process-driven deterministic model that relies on numerical computations to solely determine the estimated amount of soil loss and runoff of a given area [\[40\]](#). These computations incorporate a variety of different components, such as plant growth, residue decomposition, soil disturbances, and irrigation [\[34\]](#). The diverse set of components that are incorporated into WEPP are divided into four major categories: management, slope, soil, and climate. These components are compiled to compute the interrill and rill erosion of hillslopes and small watersheds [\[34\]](#). Actual climate measurements can be used in the model simulations or it can be generated via a climate generator. Two such generators WEPP utilizes are CLimate GENerator (CLIGEN) and Break Point Climate Data Generator (BPCDG) [\[34\]](#).

In previous studies, WEPP has been observed to estimate the amount of soil eroded from a site with relative accuracy [\[34, 25, 36\]](#). Similar studies have expanded upon this level of accuracy and found that WEPP is able to more accurately estimate soil loss than RUSLE. Stolpe [\[34\]](#) found a correlation coefficient between the measured data to be 0.93 for WEPP using the BPCDG, 0.82 for WEPP using CLIGEN, and 0.71 for RUSLE, thus concluding

Table 2.3: Soil composition and properties

Soil	Sand	Silt	Clay	K_s (mm/h)
Clay loam	30.24	40.25	29.51	1.68
Silty Clay	12.44	40.74	46.82	1.57
Silty Clay Loam	20.30	43.06	36.64	13.32
Silty Loam	29.40	49.79	20.81	16.06
Loam	41.62	33.85	24.53	133.20

that in this experiment, WEPP was more accurate at estimating the amount of erosion. The accuracy displayed by WEPP in studies such as these enables it to be utilized to estimate the amount of erosion when physical data is not available. WEPP has the capability to include BMPs, such as the work done by Srivastava et al. [33]; however, results using this function to determine P-factors for RUSLE are scarce in literature [3].

Chapter 3

Knowledge Gaps and Objectives

From the analysis of existing works presented in [Chapter 1](#) and [Chapter 2](#), it is apparent that there are currently some crucial elements missing for the revised universal soil loss equation (RUSLE) to generate consistent data. While RUSLE has been widely adopted within industry and academia due to its simplicity and ability to estimate soil loss with relative accuracy, the empirical nature of the equation has led to a necessity for physical experimentation and field observations to estimate various components of it. One such component, the erosion control practices factor (P-factor), has been observed to experience large variations across environments. To minimize the range observed for P-factors, a study was conducted to analyze the efficiency of these different practices in a controlled and uniform experimental set-up that mimicked some common environments throughout the state of Tennessee [39]. Although this study filled a necessary gap in knowledge, it has been found that a variety of different parameters influence the P-factor. Due to limitations, the conducted study was only able to determine the P-factor for three sediment control devices for three different rainfall intensities. These limitations are a direct example of the inability to fully cover the complete array of the various experiments for all of the different parameters that go into RUSLE, which is a restriction of utilizing an empirical method to determine the erosion of soil. In order to circumvent the empirical nature of an equation such as RUSLE, numerical simulations can be used to generate some of the necessary data that would otherwise rely on field observations and physical experimentation. The Water Erosion Prediction Project (WEPP) is a numerical

program that has been observed to achieve even more accurate estimates of runoff and soil loss than RUSLE [34]. WEPP, through its utilization of numerical simulations, can generate various models to predict the runoff and soil loss for a variety of different parameters.

The lack of the exact P-factors for RUSLE can be filled through the utilization of WEPP. This study will specifically focus on expanding upon the previously performed study conducted by the University of Tennessee described in [Section 2.2](#). It will focus upon expanding the data collected during the physically performed test to encompass more parameters that have been shown to influence the efficiency of these best management practices. From existing works, it was found that the soil composition had a high correlation to the efficiency of sediment control devices [4, 11, 41]. As a result, this study will focus on five different soil compositions that are prevalent in Tennessee. These exact soil compositions can be found in [Table 2.3](#). Another component that has been observed to influence the efficiency of these devices is the climate of the region. As a result, this study will analyze the runoff and soil loss for each of these soil types for four different regions of Tennessee. These regions will include the four highest populated cities in Tennessee (Knoxville, Nashville, Chattanooga, and Memphis) [1].

The objective of this study is to determine the P-factor for each combination of these different soil types and climate regions, which will be achieved by calibrating the model, performing numerical simulations for a generated watershed, and determining and analyzing the distributions of the P-factors. The generated P-factors for this study will be compiled in a reference table to be utilized in RUSLE.

Chapter 4

Methodology

Meeting the objective set forth in [Chapter 3](#) requires two sets of simulations in WEPP. The first set of simulations were performed in the hillslope mode of WEPP [3]. The hillslope represented the bare soil contained in the previously performed physical experiment. This set of simulations contained 15 models for calibrating the model to represent accurately the runoff and soil loss that was observed in the physical experiments. Adjustments were made to the moisture level, critical shear strength, effective hydraulic conductivity, and the erodibility values to match the model results with the measured data within predefined tolerances. The second set of simulations were performed in the watershed mode of WEPP. The watershed was a scaled-up version of the calibrated hillslopes. Several simulations were run consisting of 20 models that were run without any Best Management Practices, represented in WEPP as a form impoundments, 20 models that were run with filter fence impoundments, and 20 models that were run with straw-filled tubes to enable the determination of P-factors for each scenario.

4.1 Generation of Hillslope Model

As stated previously, this study expands upon the previously performed research by developing relationships between runoff coefficients and generated P-factors using the Water Erosion Prediction Project (WEPP) model simulations of the prior experiment. To translate the

previously performed experiments into WEPP, the physical lab model was mimicked in the hillslope mode of WEPP [Figure 4.1](#). The goal of these simulations were to calibrate the model, finding the values for moisture content, critical shear strength, effective hydraulic conductivity, and the erodibility values [\[2\]](#). The specific box experiment set that was used for the calibration process consisted of bare soil without sediment control devices. The calibration was conducted by employing the known management, slope, climate (rainfall intensity and duration), and soil classification. The following sections will describe these input parameters in WEPP. [Table 4.1](#) shows the default values for each of the parameters.

4.1.1 Management in WEPP Hillslope

The management of the hillslope was established as continuously fallow, as all the box experiments were conducted with the soil being bare [\[39\]](#). A bare hillslope was established in WEPP by setting the initial plant as "nothing grows" and the initial residue cropping system as "fallow".

4.1.2 Slope in WEPP Hillslope

The previously performed experiments were conducted in a 6' by 6' box with a uniform slope of 3H:1V [\[39\]](#). To match these constraints, the slope in WEPP was established as "Uniform 33_33". This governed the slope of the hillslope to be at roughly thirty-three percent. The slope generated in WEPP can be observed in [Figure 4.2](#).

4.1.3 Climate in WEPP Hillslope

The previous experiments were conducted using three different rainfall intensities (2.31, 3.29, and 4.10 in/hr) that were run for a duration of 20 minutes [\[39\]](#). The rainfall patterns were mimicked in the hillslope model by generating single storm event climate files for each of the rainfall intensities and the storm duration was set to "0.33 hr". The max intensity for each of these single storm events was set to the corresponding rainfall intensity. The storm amount generated for each single storm event was calculated utilizing the rainfall intensity and set

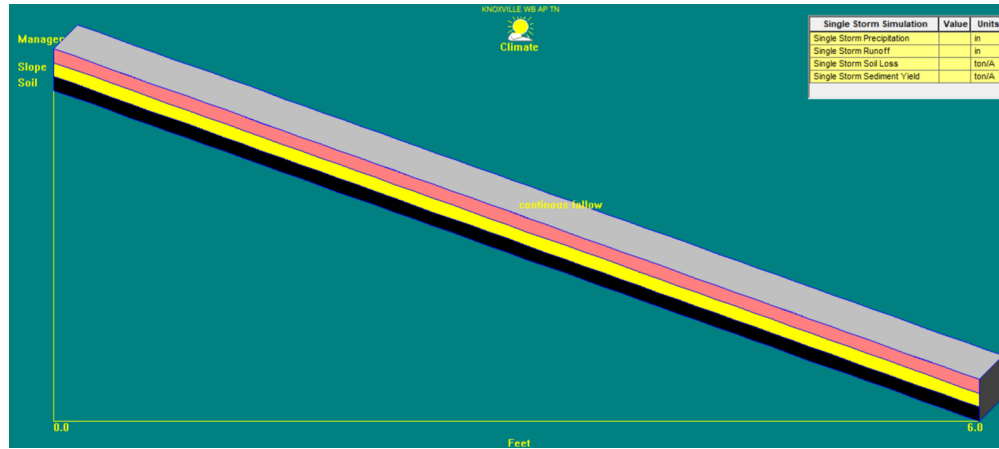


Figure 4.1: Hillslope model in WEPP

Table 4.1: Summary of Input Values

Management	
Initial	Fallow
Initial Plant Growth	Nothing Grows
Initial Residue Cropping System	Fallow
Slope	
Distance (ft)	0 6
Slope (%)	33.33 33.33
Climate	
Intensity (in/hr)	2.31 3.29 4.1
Storm Amount (in)	0.77 1.097 1.366
Duration (hr)	0.33 0.33 0.33
Soil	
Soil Type	Clay Loam Silt Clay Silt Loam Loam Silt Clay Loam
Albedo	0.23 0.23 0.23 0.23 0.23
Intial Saturation Level (%) *	0 0 0 0 0
Interill Erodibility (kg.s/m ⁴) *	4000000 4000000 4000000 4000000 4000000
Rill Erodibility (s/m) *	0.005 0.005 0.005 0.005 0.005
Critical Shear (Pa) *	5.6 5.6 5.6 5.6 5.6
Effective Hydraulic Conduitivity (mm/h) *	0.15 0.15 0.15 0.15 0.15
Sand (%)	30.24 12.44 29.4 41.62 20.3
Clay (%)	29.51 46.82 20.81 24.53 36.64

* Starting input parameters, later calibrated

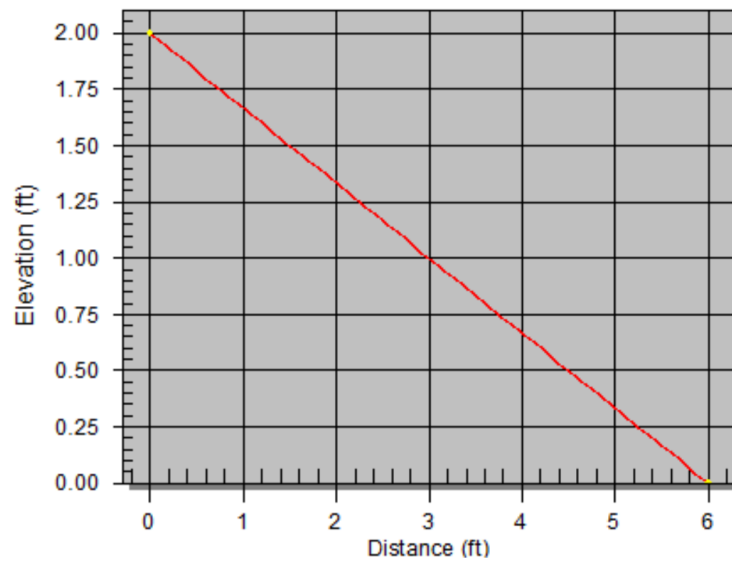


Figure 4.2: Slope in WEPP

accordingly. The rainfall amounts were set as "0.77, 1.097, and 1.366 in" in ascending order of rainfall intensity.

4.1.4 Soil in WEPP Hillslope

An analysis of the various soil textures in the state of Tennessee found that certain classifications are more predominant, which aided in selecting the specific soil textures to include in the study. There are seven major soil types in the state as follows: silt loam (64%); loam (16%); silty clay loam (9%); sandy loam (8%); clay loam (1%); silty clay (1%); and clay (1%). The soil types with the highest capacity to store water include silt loam, silty clay loam, and loam, which are the most abundant in Tennessee [39]. Though this analysis, it was determined that clay loam, silty clay, silty clay loam, and loam were going to be evaluated, and the composition of these soils can be seen in [Table 2.3](#). These soil textures were integrated into the hillslope model by generating new soil files in the soil database in WEPP. For each of the five soil textures, the percent sand and clay content was set to the corresponding value shown in [Table 2.3](#), while the albedo was set to the default "0.23". The interrill erodibility, rill erodibility, critical shear, effective hydraulic conductivity, and initial saturation levels were initially set to the default values, but were later adjusted during the calibration phase.

4.1.5 Calibration Process

The simulation had to initially be properly calibrated to determine the necessary starting parameters for each of the different soil types as mentioned in [Section 4.1.4](#). These soil parameters include moisture level, critical shear strength, effective hydraulic conductivity, and the erodibility values. Each of these parameters were observed to shift depending on the soil type and rainfall intensity. These shifts will occur because these parameters control the output data for the single storm runoff and single storm soil loss. Throughout the calibration process, it was observed that all these parameters will have an impact on the amount of soil

loss, but only the moisture level and effective hydraulic conductivity influence the amount of storm runoff.

To calibrate the model properly, adjustments were made to the baseline moisture level, critical shear strength, effective hydraulic conductivity, and the erodibility values to appropriately model the measured sediment loss within a predefined acceptable tolerance. The adjustments were made in accordance with the ranges found in literature ([Table 4.2](#)). The predefined tolerances for the study were determined utilizing the data collected during the experimental portion of the bare-box study that did not contain any impoundments and can be observed in [Table 4.3](#). The known values from the box experiments that were implemented into WEPP, along with starting parameter values, were based upon literature and are found in [Table 4.2](#). The final calibrated values for each of the different soil textures can be found in [Appendix A](#). The soil loss and runoff data from each of these calibrated models and their comparison to the predefined target values can be seen in [Figure 4.3](#) and [Figure 4.4](#).

4.2 Generation of Watershed Model

Once the previously performed experimental set-up was mimicked by the hillslope model and properly calibrated, a watershed model that accurately simulated both the single storm runoff and single storm soil loss was generated to acquire the P-factors. The watershed projects were produced by importing the previously generated hillslopes and using the properly calibrated parameters for each of the different combinations of soil textures and rainfall intensities. These parameters were averaged for each of the different soils across the different intensities and can be seen in [Table 4.4](#). The moisture content, effective hydraulic conductivity, critical shear stress, and erodibility values had to be averaged due to model limitations that require at least one year of climate data for the impoundments to be properly simulated. The climate data was expanded utilizing a climate generator, CLIGEN. The 50 years of climate data were generated for Knoxville, Nashville, Chattanooga, and Memphis to ensure accuracy because WEPP requires a period of at least 25 years to provide stable climate estimation

Table 4.2: Ranges from Literature

Ranges from Literature			
Overall Ranges from Literature			
Parameters	Ranges	Units	Reference
Interrill Erodibility (K_i)	1e5 to 1e7	$kg \cdot s/m^4$	[10, 28]
Rill Erodibility (K_r)	0.002 to 0.013	s/m	[10, 17]
Critical Shear Stress (τ_c)	3 to 8	Pa	[6, 7, 30]
Effective Hydraulic Conductivity (K_{be})	0.15 to 1.13	mm/hr	[10, 17, 21]
Baseline Parameters			
K_i	4,000,000	$kg \cdot s/m^4$	[2]
K_r	0.005	s/m	
τ_c	5.6	Pa	
K_{be}	0.15	mm/hr	

Table 4.3: Predefined tolerances for simulations

Intensity	Target Values					
	2.31	2.31	3.29	3.29	4.1	4.1
	Runoff (L)	Sediment (kg)	Runoff (L)	Sediment (kg)	Runoff (L)	Sediment (kg)
Clay Loam	$23.68 \pm 12\%$	$0.393 \pm 85\%$	$33.72 \pm 12\%$	$0.560 \pm 85\%$	$42.03 \pm 12\%$	$0.698 \pm 85\%$
Silt Clay	$21.58 \pm 12\%$	$0.4 \pm 85\%$	$33.53 \pm 12\%$	$0.502 \pm 85\%$	$43.37 \pm 12\%$	$0.725 \pm 85\%$
Silt Clay Loam	$14.72 \pm 34\%$	$0.119 \pm 57\%$	$20.96 \pm 34\%$	$0.170 \pm 57\%$	$26.13 \pm 34\%$	$0.211 \pm 57\%$
Silt Loam	$11.15 \pm 40\%$	$0.134 \pm 74\%$	$11.87 \pm 27\%$	$0.191 \pm 74\%$	$12.46 \pm 18\%$	$0.238 \pm 74\%$
Loam	$11.2 \pm 40\%$	$0.081 \pm 74\%$	$11.7 \pm 27\%$	$0.220 \pm 74\%$	$12.6 \pm 18\%$	$0.251 \pm 74\%$

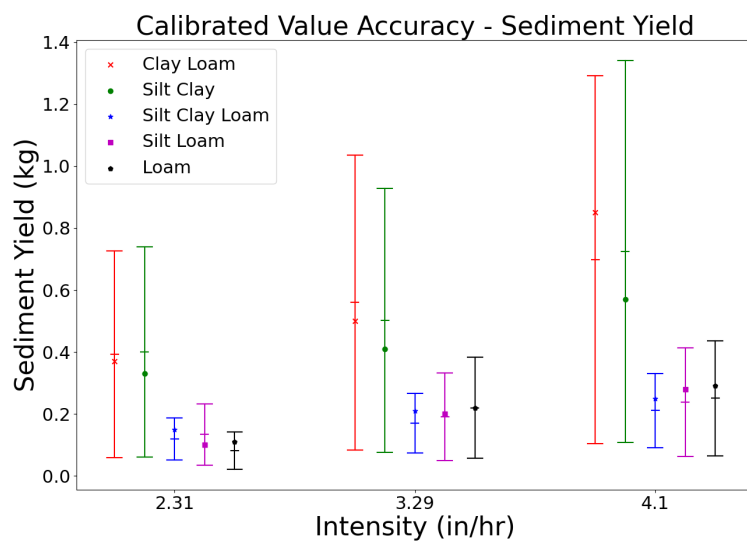


Figure 4.3: Sediment Yield Calibration Accuracy

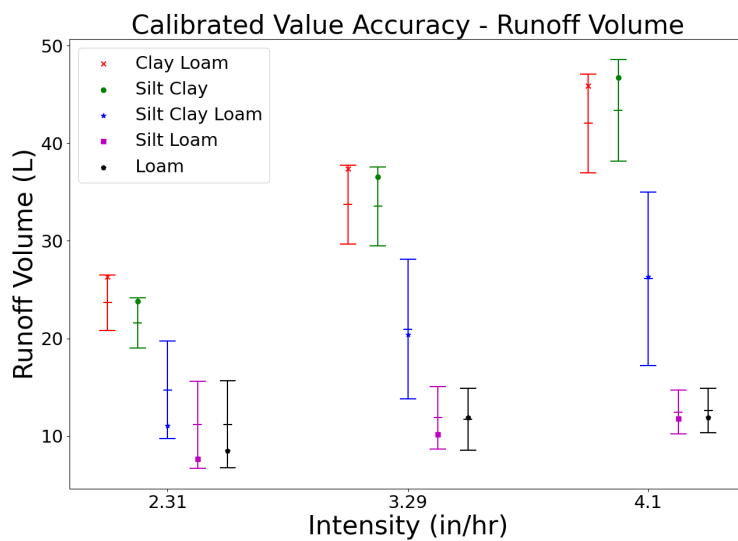


Figure 4.4: Runoff Calibration Accuracy

Table 4.4: Averaged parameters for each soil

Soil Type	Clay Loam	Silty Clay	Silty Clay Loam	Silty Loam	Loam
Components	Output				
Moisture Level	25.00	25.00	69.62	57.99	75.00
K_i (kg·s/m ⁴)	629960.5	542883.5	736806.3	1000000.0	1000000.0
K_r (s/m)	0.005	0.004	0.004	0.005	0.005
τ_c (Pa)	5.500	5.500	5.810	5.500	5.500
K_e (mm/h)	3.634	4.182	11.238	14.157	23.588

and 50 years for sediment parameters [27]. The watershed models were created utilizing the generated hillslopes; however, the dimensions of the box were scaled up to receive a substantial quantity of output data. The model was scaled up by increasing the width to 10,000 ft, while maintaining the original length of 6 ft. The selected scale was established by ensuring the watershed model generated the same soil loss in kg/m^2 as the calibrated hillslope model, while maintaining an area greater than 0.1 acre. If the area was substantially smaller than what was selected, the amount of soil loss would not be significant enough to be reported by WEPP. Several different watershed projects were generated to simulate different soil classifications, climate, and impoundments. Each of the watershed models was set to run for a single year and to utilize the kinematic wave to calculate the runoff. Through a comparison between these simulations, an efficiency of the erosion control device can be determined.

It was necessary to modify these calibrated hillslopes in order to accurately represent the data collected from the physically performed experiments in the watershed mode of WEPP, because it is the only mode in which impoundments can be included. WEPP incorporates several practices, such as farm ponds, culverts, filter fences, and check dams in the form of impoundments [3]. The specific BMPs included in this study were modeled through impoundments. These impoundments are installed at the outlet of the hillslope and channel.

4.3 Generation of P-factors

Initially, the generated watershed models were run to simulate each of the different combinations of soil types and climate regions without impoundments. These simulations generated a baseline for the projected erosion for the modeled box experiments. Once the baseline was established for the modeled data, simulations were run for each of impoundments included in the previous work, including silt fences and straw-filled sediment tubes [39]. To properly mimic the previously performed experiment, impoundments were generated in the impoundment database that reflected the known parameters from the physical lab model. The dimensions implemented into WEPP are illustrated in [Table 4.5](#). Due to the lack of a

Table 4.5: Dimensions of impoundments

	Filter Fence	Straw-filled Sediment Tubes
Slurry flow rate (ft/s)	0.0007	0.0125
Cross-sectional width (ft)	5	6
Stage at which flow begins (ft)	0	0
Overtopping stage (ft)	3	1.67

measured slurry flow rate and the inability to calibrate the model to achieve this parameter, the slurry flow rate for each of these impoundments were acquired through literature [19]. The slurry flow rate is the rate in which the sediment slurry is able to move through the sediment control devices [5]. The slurry flow rate is a reflection of the silt fence design. It considers the mesh size and material, which dictates the size of the particles and the rate at which they pass through. Similar to the previous work, the P-factors were determined by comparing the baseline erosion to the erosion found for each of the different sediment control devices. The equation used to calculate these P-factors can be seen in [Equation 2.2](#).

Chapter 5

Results and Discussion

To achieve the objective set forth in [Chapter 3](#), the model was calibrated and numerical simulations were performed to determine the amount of runoff and soil loss for the defined watershed. These numerical simulations were run with and without impoundments for each combination of soil type and climate region as described in [Chapter 4](#).

5.1 Baseline Soil Erosion

The numerical simulations run in the Water Erosion Prediction Project (WEPP) were first generated without impoundments for each combination of soil type and climate region to establish the baseline erosion of the soil. The baseline erosion of soil generated from the abbreviated yearly average for the watershed for each combination of soil type and climate region can be observed in [Table 5.1](#). The total amount of precipitation for each climate region stayed consistent across the differing soil types. Similar to the previously performed study conducted at the University of Tennessee - Knoxville (UTK), the variability of the soil loss and runoff at each climate regions is drastic. Memphis experiences the greatest variability in both soil loss and runoff. The soil loss observed for Memphis ranges from 1.05 to 1.86 kg/m², along with a runoff ranging from 3,015 to 6,736 m³.

This variability observed for both the runoff and soil loss is a direct result of the soil type. Upon observation, the same trends for this study and the previous study have been found

Table 5.1: Summary of Numerical Simulations Without Sediment Control Devices

Soil Type	Location	Runoff (m ³)	Precipitation Volume (m ³)	Gross Soil Erosion (kg/m ²)	Runoff Coefficient
Clay Loam	Knoxville	4326	13567	0.91	0.32
	Nashville	4888	13491	1.07	0.36
	Chattanooga	6009	15287	1.42	0.39
	Memphis	6736	14846	1.05	0.45
Silt Clay	Knoxville	3474	13567	0.79	0.26
	Nashville	3988	13491	1.01	0.30
	Chattanooga	5080	15287	1.35	0.33
	Memphis	5756	14846	1.10	0.39
Silt Clay Loam	Knoxville	2042	13567	0.79	0.15
	Nashville	2580	13491	1.14	0.19
	Chattanooga	3459	15287	1.46	0.23
	Memphis	4002	14846	1.37	0.27
Silt Loam	Knoxville	1418	13567	0.89	0.10
	Nashville	1930	13491	1.31	0.14
	Chattanooga	2693	15287	1.79	0.18
	Memphis	3015	14846	1.69	0.20
Loam	Knoxville	1623	13567	0.97	0.12
	Nashville	2181	13491	1.42	0.16
	Chattanooga	2979	15287	1.89	0.19
	Memphis	3288	14846	1.86	0.22

between soil loss, runoff, and intensity. As a result of these similarities, the same conclusion that runoff has a greater influence than the total rainfall has been drawn for this study [39]. This can be further observed in [Figure 5.1](#).

It is apparent through this comparison that the type of soil has a greater influence on the soil loss than the amount of rainfall. [Figure 5.1](#) shows that there is a direct relationship between both the amount of soil loss and runoff with the runoff coefficient for the differing soil types. Similar to the physical experiments, the amounts of soil loss and runoff have increasing relationships with the runoff coefficient. In examining these trends, it is also apparent that there is no direct correlation between the amount of rainfall and gross soil erosion. The graphs do, however, indicate that the amount of soil loss will be larger for areas that receive larger influxes of rainfall, illustrated by Knoxville's reduced sediment loss in comparison to Memphis.

To fully understand all the data trends, along with determining the empirical relationship between runoff coefficient and gross soil loss, a breakdown of each event was observed using the WEPP output data. The full summary of these events for each soil type and climate region can be found in [Appendix B](#). Due to the observation that soil composition influences the soil loss more substantially than rainfall intensity, the following trends and empirical relationships will only be analyzed across the differing soil types. The loam soil composition had the highest sediment yield, indicating that it will encounter the greatest amount of sediment removed from its defined area by runoff. For loam, the average sediment yield was $0.09 \pm 0.12 \text{ kg/m}^2$, while the average runoff was $135.83 \pm 153.23 \text{ m}^3$ and the runoff coefficient was 0.26 ± 0.14 . The summary of the averages can be observed in [Table 5.2](#).

Through the analysis of the various events for each soil type, an empirical relationship can be developed between the runoff coefficient and the sediment yield. For each soil type, the regression relationships were found to be the most accurate predicting sediment yield through exponential functions. The exponential relationship between the runoff coefficient and sediment yield can only be observed for each individual soil type and is not present across the different soil types. These regression equations can be found in [Equation 5.1](#) through [Equation 5.5](#) and further observed in [Figure 5.2](#) through [Figure 5.6](#). For these equations

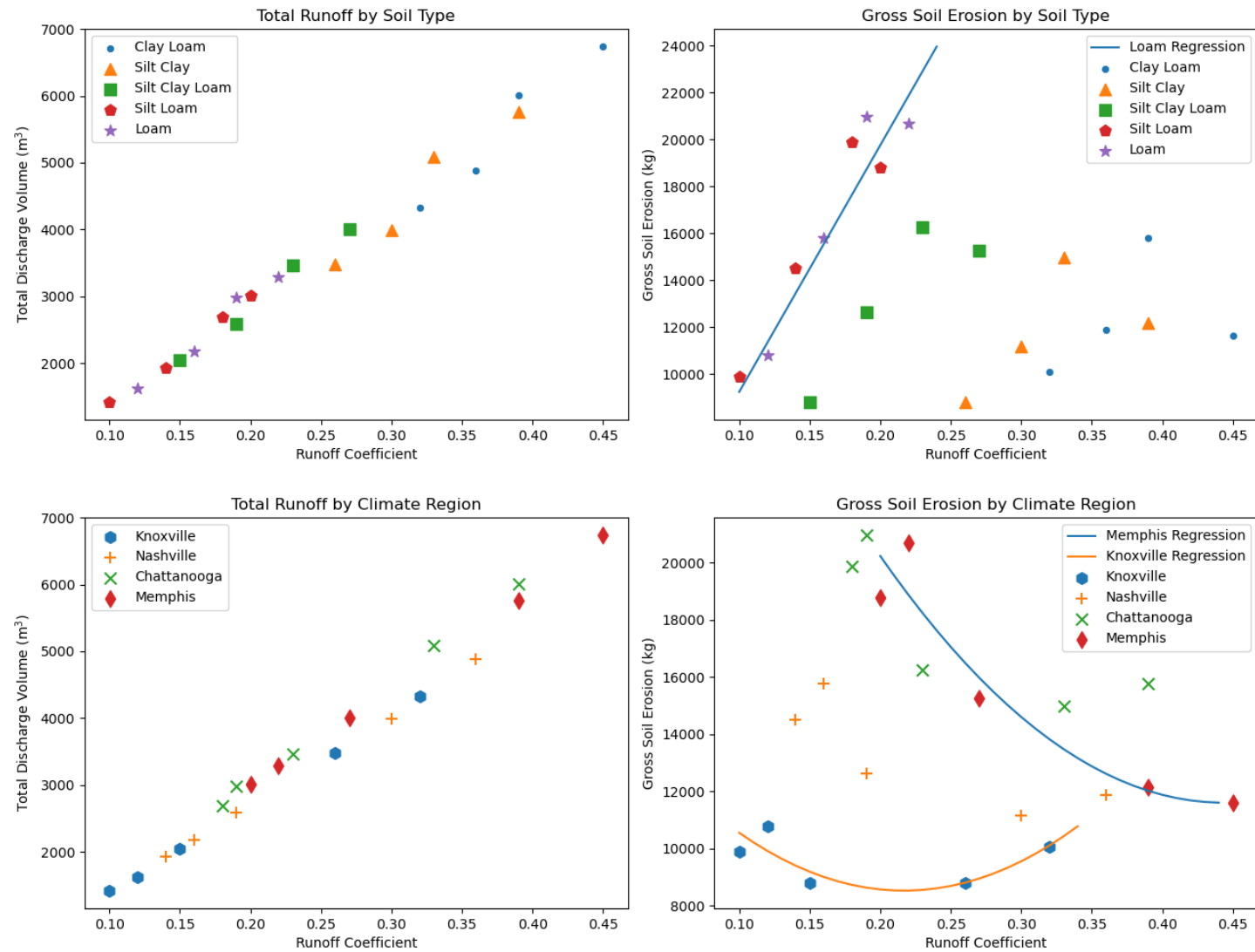


Figure 5.1: Relationships of Both Gross Soil Erosion and Runoff in Comparison to Runoff Coefficient

Table 5.2: Summary of Event Averages

Soil Type	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg/m ²)
Clay Loam	165.08 $\pm$ 167.20	0.43 $\pm$ 0.17	0.04 $\pm$ 0.06
Silt Clay	159.67 $\pm$ 161.87	0.39 $\pm$ 0.16	0.04 $\pm$ 0.06
Silt Clay Loam	138.13 $\pm$ 156.62	0.28 $\pm$ 0.15	0.06 $\pm$ 0.08
Silt Loam	127.21 $\pm$ 149.52	0.24 $\pm$ 0.14	0.09 $\pm$ 0.12
Loam	135.83 $\pm$ 153.23	0.26 $\pm$ 0.14	0.09 $\pm$ 0.12

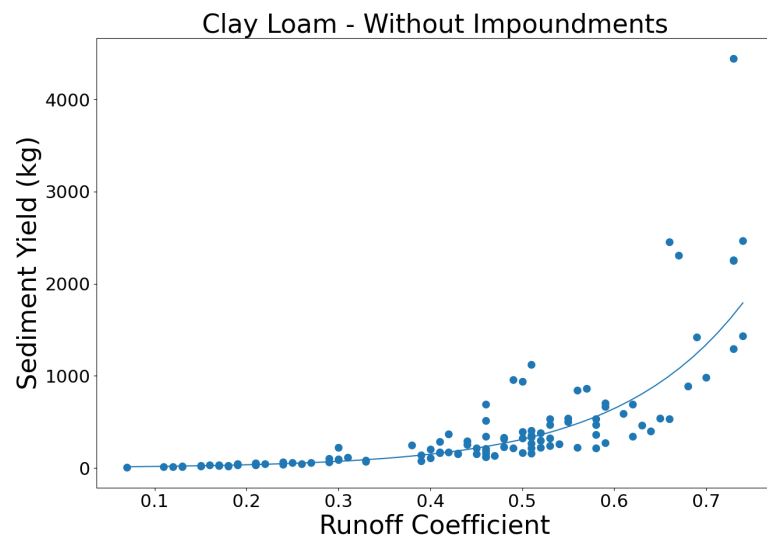


Figure 5.2: Regressions Without Impoundments - Clay Loam

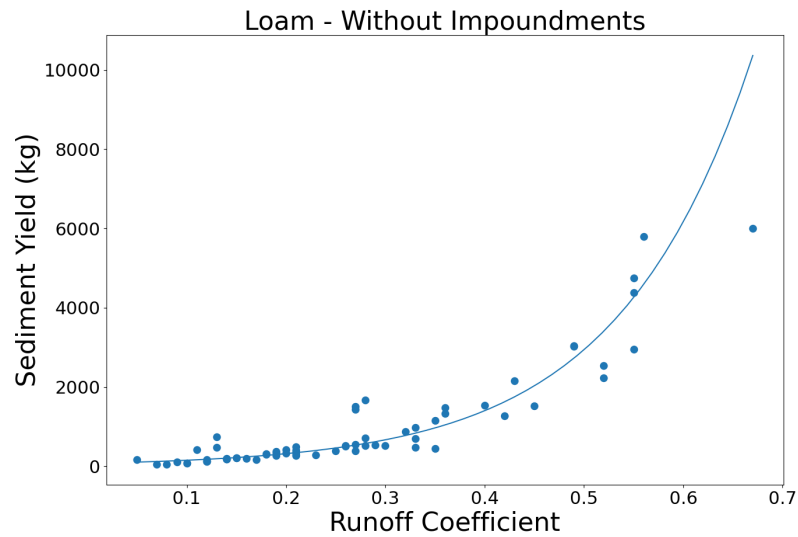


Figure 5.3: Regressions Without Impoundments - Loam

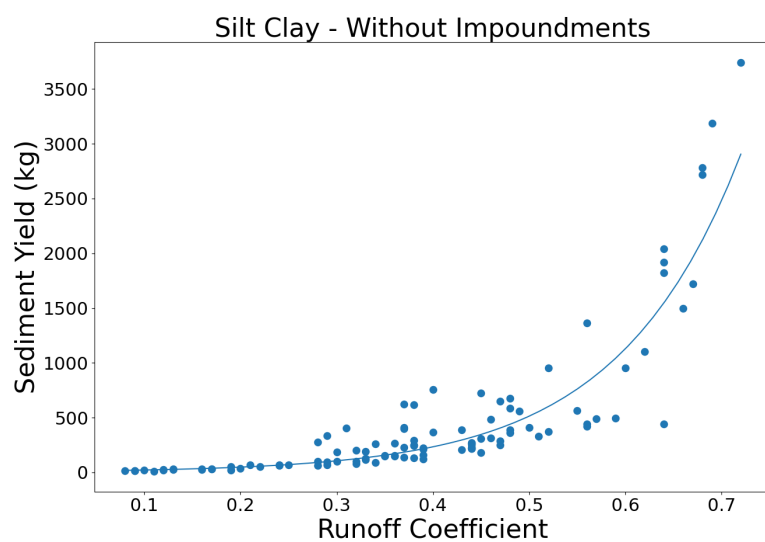


Figure 5.4: Regressions Without Impoundments - Silt Clay

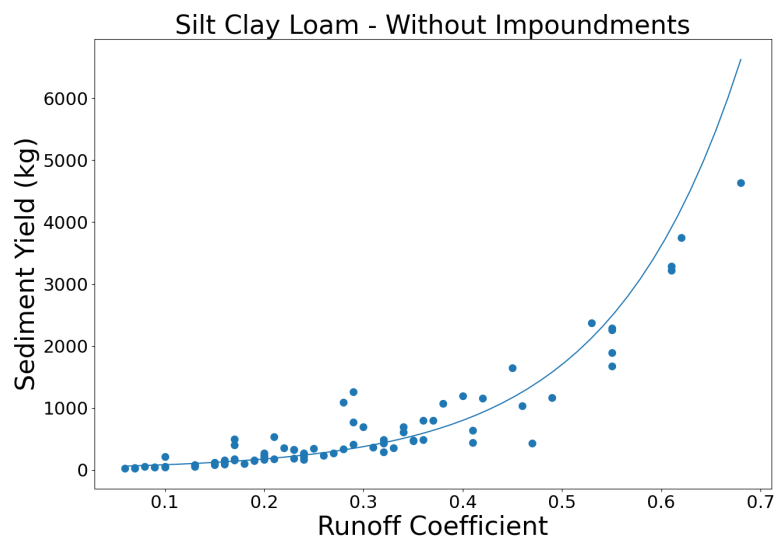


Figure 5.5: Regressions Without Impoundments - Silt Clay Loam

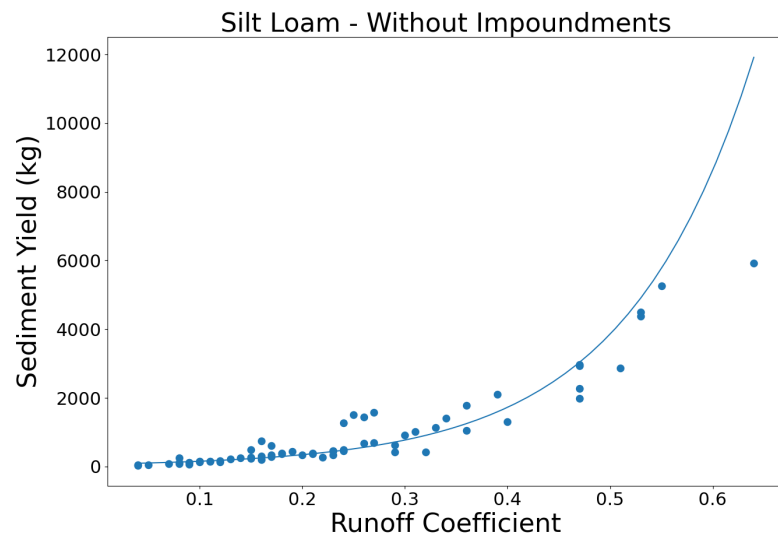


Figure 5.6: Regressions Without Impoundments - Silt Loam

sediment yield is represented as E , while the runoff coefficient is represented as RC . The sediment yield for these regression equations is computed in kilograms.

$$\text{Clay Loam: } E = 8.0844e^{7.2981 \cdot RC} \quad (r^2 = 0.6882) \quad (5.1)$$

$$\text{Loam: } E = 72.293e^{7.4109 \cdot RC} \quad (r^2 = 0.8408) \quad (5.2)$$

$$\text{Silt Clay Loam: } E = 38.937e^{7.5541 \cdot RC} \quad (r^2 = 0.9235) \quad (5.3)$$

$$\text{Silt Clay: } E = 10.000e^{7.8773 \cdot RC} \quad (r^2 = 0.8600) \quad (5.4)$$

$$\text{Silt Loam: } E = 68.760e^{8.0547 \cdot RC} \quad (r^2 = 0.8612) \quad (5.5)$$

These empirical relations can be utilized if the baseline erosion for experiments conducted with sediment control devices are unknown. If the climate region is known and a higher level of accuracy in estimating the amount of sediment yielded is desired, detailed regression equations for each combination of soil type and climate region can be found in [Appendix C](#). As a result of the baseline for each of these events being known, these regression equations will not be fully utilized in this study; however, they can simplify future studies by enabling the determination of the baseline of erosion.

5.2 Erosion Control Practices Factor

Once the baseline erosion had been established, numerical simulations were run with impoundments for each combination of soil type and climate region. As previously stated, WEPP incorporates Best Management Practices through the utilization of impoundments. The two impoundments, as BMPs, selected for this study include silt fences and straw-filled sediment tubes. The erosion of soil generated from the abbreviated yearly average for the watershed for each combination of soil type and climate region can be observed in [Table 5.3](#)

Table 5.3: Summary of Numerical Simulations with Silt Fences

Soil Type	Location	Runoff (m ³)	Precipitation Volume (m ³)	Filter Fence Sediment Yield (kg/m ²)	Runoff Coefficient	P-Value
Clay Loam	Knoxville	4326	13567	0.42	0.32	0.46
	Nashville	4888	13491	0.50	0.36	0.47
	Chattanooga	6009	15287	0.65	0.39	0.47
	Memphis	6736	14846	0.49	0.45	0.47
Silt Clay	Knoxville	3474	13567	0.27	0.26	0.35
	Nashville	3988	13491	0.35	0.30	0.35
	Chattanooga	5080	15287	0.47	0.33	0.35
	Memphis	5756	14846	0.38	0.39	0.35
Silt Clay Loam	Knoxville	2042	13567	0.27	0.15	0.34
	Nashville	2580	13491	0.38	0.19	0.34
	Chattanooga	3459	15287	0.50	0.23	0.34
	Memphis	4002	14846	0.46	0.27	0.34
Silt Loam	Knoxville	1418	13567	0.47	0.10	0.53
	Nashville	1930	13491	0.69	0.14	0.53
	Chattanooga	2693	15287	0.96	0.18	0.54
	Memphis	3015	14846	0.90	0.20	0.53
Loam	Knoxville	1623	13567	0.38	0.12	0.39
	Nashville	2181	13491	0.55	0.16	0.39
	Chattanooga	2979	15287	0.74	0.19	0.39
	Memphis	3288	14846	0.72	0.22	0.39

for silt fences and [Table 5.4](#) for straw-filled sediment tubes. The P-factor observed in these tables was calculated using [Equation 2.2](#).

For both of these sediment control devices, the runoff and soil loss vary greatly. The silt fences experience the least fluctuation for both the amount of sediment yield and runoff. In regards to the soil composition, silt loam had the largest range for sediment yield ranging from 0.47 to 0.96 kg/m², while clay loam and silt clay have the largest range for runoff coefficient ranging from 0.32 to 0.45 and 0.26 to 0.39, respectively. The straw-filled sediment tubes follow similar trends for both sediment yield and runoff to that of the silt fences. Although the straw-filled sediment tubes follow those trends, deviation occurs between the observed trends for the two sediment control devices for the erosion control practice factor (P-factor). The P-factor for each soil type experience slight fluctuations for silt fences but are uniform for straw-filled sediment tubes. Through the numerical simulations for filter fences, silt loam was observed to have the highest P-factor of 0.54, while silt clay loam was observed to have the smallest P-factor of 0.34.

As indicated in the general summary for both sediment control devices, the P-factor does not fluctuate based on the different rainfall intensities or runoff. The average abbreviated data achieved a uniform P-factor for each of the different soil types. To fully understand the trends in the data and define empirical relationships, an analysis of the events was conducted. The full summary of these events for both the silt fences and the straw-filled sediment tubes for each soil type and climate region can be found in [Appendix B](#). Similar to the baseline soil erosion data, the trends and empirical relationships were developed for each of the different soil types. For both the silt fence and straw-filled sediment tube, silt loam was observed to have the highest sediment yield. The sediment yield found for silt loam for both silt fences and straw-filled sediment tubes was 0.05 ± 0.06 kg/m². As stated previously, the P-factor is directly influenced by its soil type. The soil type that was able to achieve the lowest P-factor, thus making it the least likely to contribute to sediment pollution, was silt clay loam. The summary of these event averages can be observed in [Table 5.5](#) for silt fences and [Table 5.6](#) for straw-filled sediment tubes.

Table 5.4: Summary of Numerical Simulations with Straw-filled Sediment Tubes

Soil Type	Location	Runoff (m ³)	Precipitation Volume (m ³)	Straw-Filled Sediment Yield (kg/m ²)	Runoff Coefficient	P-Value
Clay Loam	Knoxville	4327	13567	0.43	0.32	0.48
	Nashville	4891	13491	0.51	0.36	0.48
	Chattanooga	6013	15287	0.68	0.39	0.48
	Memphis	6739	14846	0.50	0.45	0.48
Silt Clay	Knoxville	3476	13567	0.28	0.26	0.35
	Nashville	3990	13491	0.36	0.30	0.35
	Chattanooga	5083	15287	0.47	0.33	0.35
	Memphis	5760	14846	0.38	0.39	0.35
Silt Clay Loam	Knoxville	2043	13567	0.27	0.15	0.35
	Nashville	2582	13491	0.40	0.19	0.35
	Chattanooga	3462	15287	0.51	0.23	0.35
	Memphis	4004	14846	0.47	0.27	0.35
Silt Loam	Knoxville	1418	13567	0.49	0.10	0.55
	Nashville	1931	13491	0.72	0.14	0.55
	Chattanooga	2694	15287	0.98	0.18	0.55
	Memphis	3017	14846	0.93	0.20	0.55
Loam	Knoxville	1624	13567	0.38	0.12	0.40
	Nashville	2187	13491	0.56	0.16	0.40
	Chattanooga	2981	15287	0.76	0.19	0.40
	Memphis	3290	14846	0.74	0.22	0.40

Table 5.5: Statistical Breakdown of Events for Silt Fences

Soil Type	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg/m ²)	P-Factor
Clay Loam	164.95 ± 167.18	0.43 ± 0.17	0.02 ± 0.03	0.45 ± 0.03
Silt Clay	159.97 ± 161.87	0.39 ± 0.16	0.01 ± 0.02	0.34 ± 0.01
Silt Clay Loam	138.03 ± 156.64	0.28 ± 0.15	0.02 ± 0.03	0.33 ± 0.01
Silt Loam	127.12 ± 149.55	0.24 ± 0.14	0.05 ± 0.06	0.51 ± 0.03
Loam	135.72 ± 153.24	0.26 ± 0.14	0.03 ± 0.05	0.38 ± 0.01

Table 5.6: Statistical Breakdown of Events for Straw-filled Sediment Tubes

Soil Type	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg/m ²)	P-Factor
Clay Loam	165.05 ± 167.22	0.43 ± 0.17	0.02 ± 0.03	0.48 ± 2.41e-3
Silt Clay	159.67 ± 161.89	0.39 ± 0.16	0.01 ± 0.02	0.35 ± 1.09e-3
Silt Clay Loam	138.11 ± 156.64	0.28 ± 0.15	0.02 ± 0.03	0.35 ± 7.72e-4
Silt Loam	127.19 ± 149.54	0.24 ± 0.14	0.05 ± 0.06	0.55 ± 1.02e-3
Loam	135.8 ± 153.25	0.26 ± 0.14	0.04 ± 0.05	0.40 ± 4.99e-4

In analyzing the breakdown of the events, larger variations in the data were observed. An Analysis of Variance (ANOVA) determined that there was a significant difference in the P-factor for the silt fences and straw-filled sediment tubes (ANOVA; $p < 0.05$). Although the difference was significant for both sediment control devices, the P-factors analyzed by soil type were found to be similar (ANOVA; $p > 0.05$). This solidifies the previous observation that the soil type is the primary component for determining the P-factor. The data utilized and calculated for the single factor ANOVA can be observed in [Appendix D](#). Although the P-factors were determined to be similar for each soil type, slight variations were observed for silt fences that were substantial enough to impact the P-factor inserted in RUSLE. These variation in data were further analyzed for silt fences to comprehend the underlying reasons for the differences. The variation for both the runoff coefficient and the P-factor for silt fences can be observed in [Figure 5.7](#) through [Figure 5.16](#).

The previously performed study concluded that the amount of runoff was the primary component influencing the amount of soil that was eroded [39]. Similar trends can be observed in the analysis of the numerical simulations with and without impoundments. The numerical simulations generated for straw-filled sediment tubes were not observed to experience the same level of fluctuations in the P-factor as the silt fences because they receive consistent erosion rates. One such explanation for this lack of fluctuation is that the efficiency of straw-filled bales is not impacted by the amount of runoff. Silt fences are observed to be slightly more efficient for shorter rainfall events as these generate a smaller amount of runoff. Although that conclusion was similarly observed in the analysis of the numerical simulations, a major component that has been observed to have more influence in the numerical simulations is the soil composition. As observed in [Figure 5.7](#) through [Figure 5.11](#), the events experience a wide range of runoff, and the runoff observed is consistent for both sediment control devices. This indicates that while the runoff does contribute to erosivity of the soil, it is not the primary component of determining the efficiency of these sediment control devices. For both the numerical simulations with and without impoundments, it has been observed that the soil composition is a primary factor for soil erosion, runoff, and the efficiency of these sediment control devices.

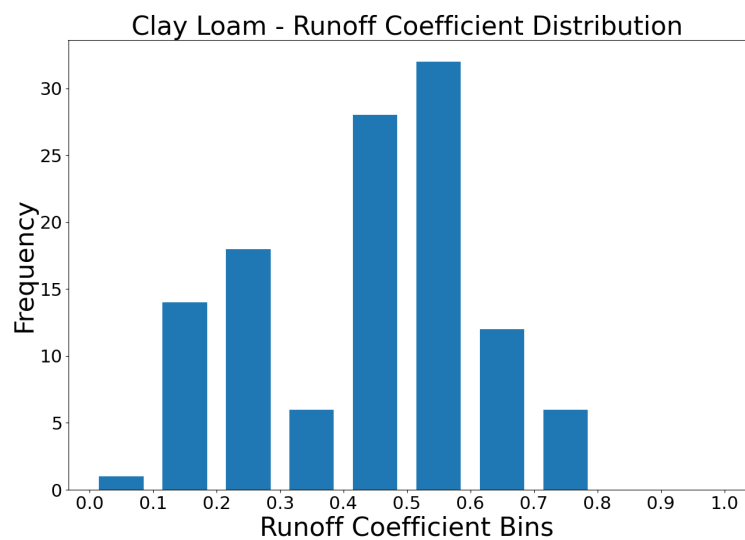


Figure 5.7: Runoff Coefficient Distribution - Clay Loam

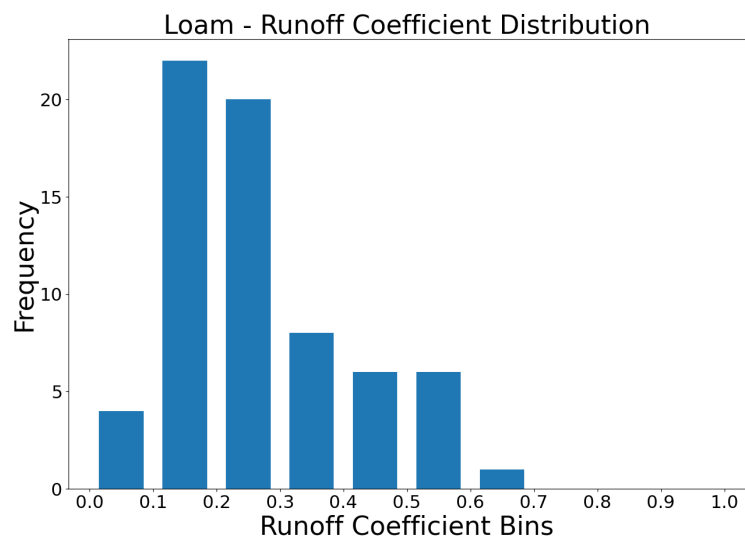


Figure 5.8: Runoff Coefficient Distribution - Loam

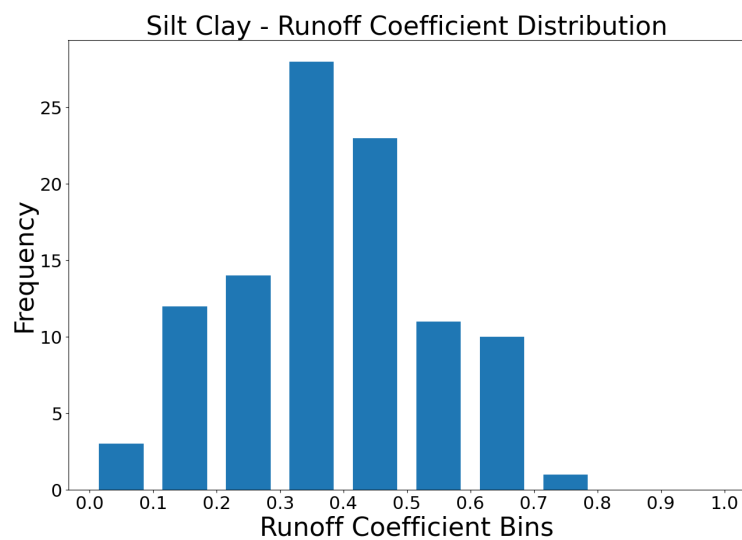


Figure 5.9: Runoff Coefficient Distribution - Silt Clay

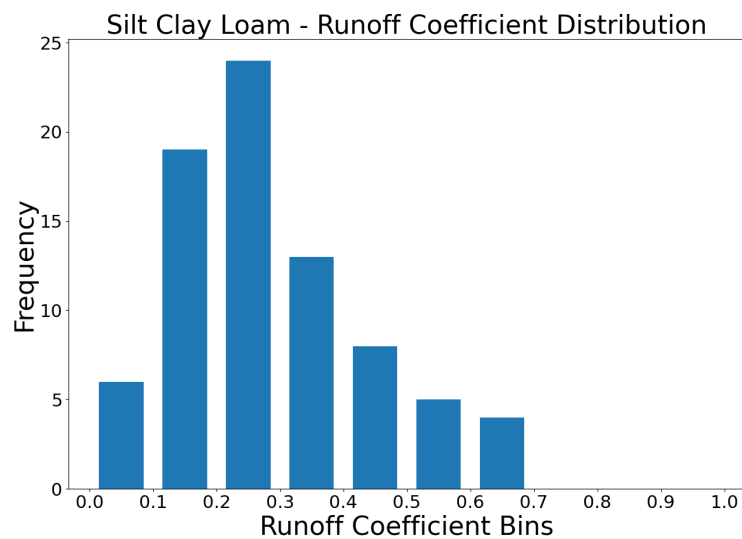


Figure 5.10: Runoff Coefficient Distribution - Silt Clay Loam

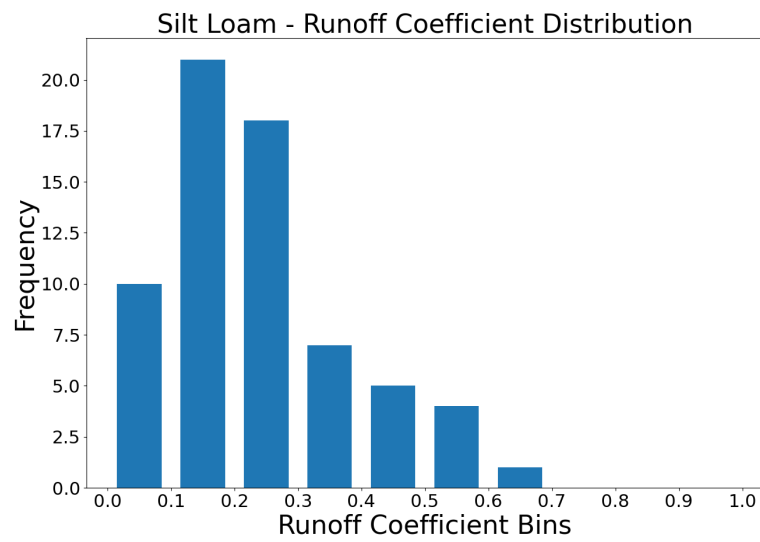


Figure 5.11: Runoff Coefficient Distribution - Silt Loam

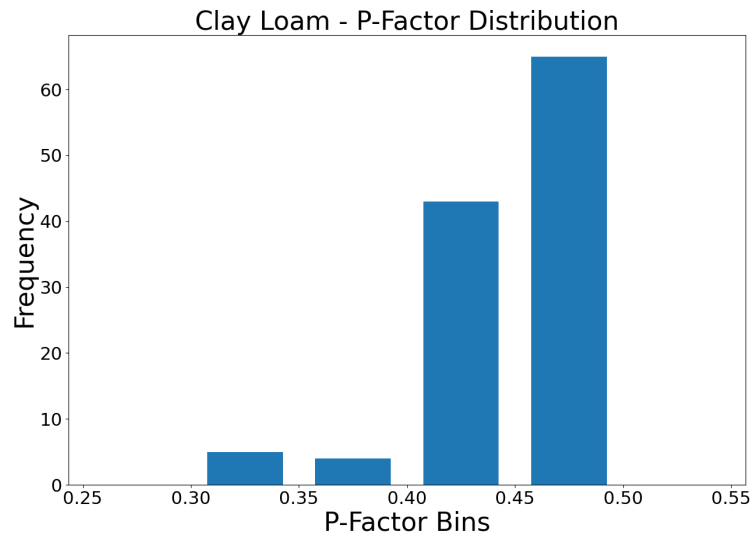


Figure 5.12: P-Factor Distribution - Clay Loam

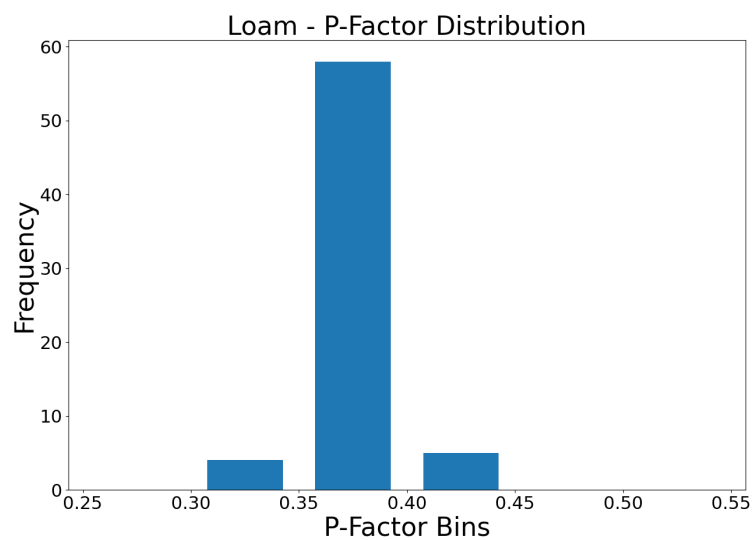


Figure 5.13: P-Factor Distribution - Loam

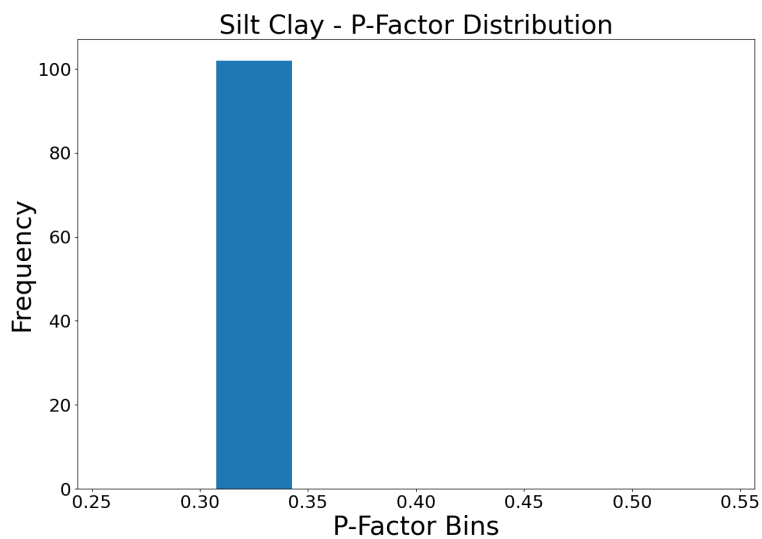


Figure 5.14: P-Factor Distribution - Silt Clay

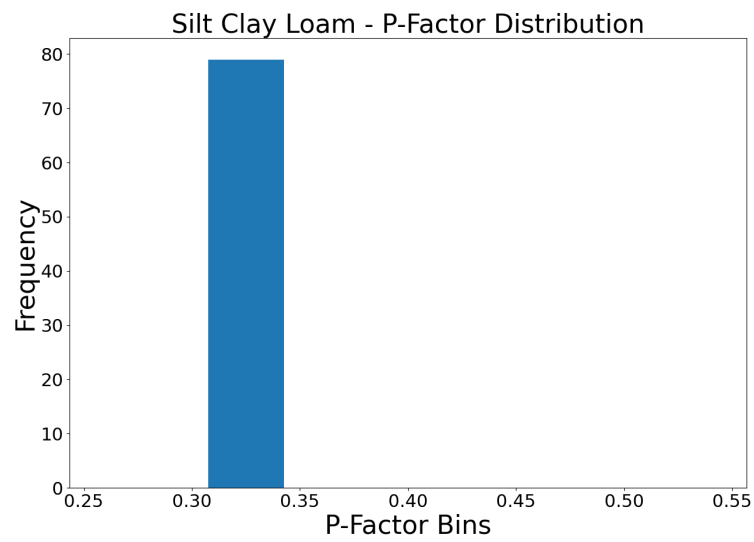


Figure 5.15: P-Factor Distribution - Silt Clay Loam

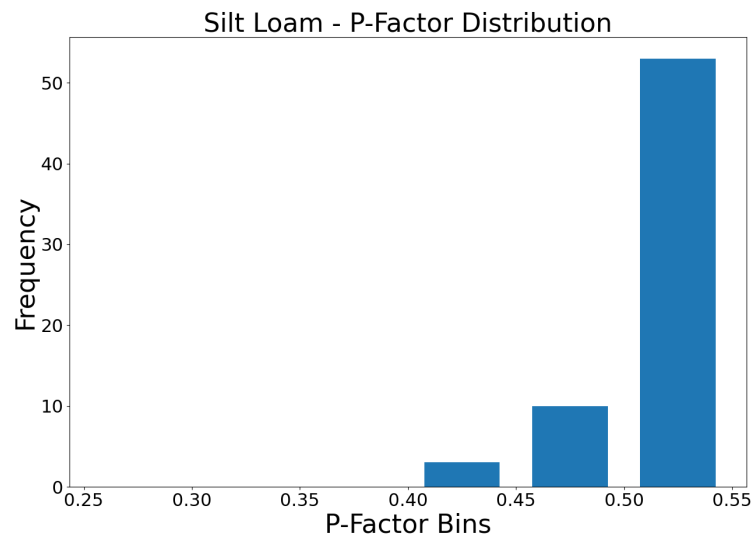


Figure 5.16: P-Factor Distribution - Silt Loam

Many studies have observed that soil composition is a primary component in impacting the overall efficiency of sediment control devices, and in particular, it has been shown to be especially impactful for silt fences. One such study found that the overall efficiency of these devices decreased as the soil particle size decreased [41]. Another study expounded upon these observations by finding that 92% of the total suspended solids (TSS) in the runoff from silt fences was composed of clay and silt [4]. Similar observations can be seen in [Table 5.7](#) which summarizes the soil composition breakdown for silt fences. A more detailed breakdown can be observed in [Appendix E](#). For this study, the numerical simulations were able to retain a significant amount of sand but were unable to provide any considerable retention for silt and clay particles. The retention of these larger soil particles is a result of the design of these sediment control devices, which are designed to mitigate the amount of soil erosion by retaining the soil through a physical barrier. Silt fences in particular physically retain the soil through the use of a mesh barrier. Any particle that is smaller than the gaps in the mesh barrier will not be retained by the silt fence. The retention of these larger soil particles indicates that the efficiency of these sediment control devices is impacted by the soil composition. Similar trends are expected for the straw-filled sediment tubes due to their similar retention abilities.

The soil composition and method of retention for these sediment control devices can offer insight into the level of efficiency for these devices and the variation observed in [Figure 5.12](#) through [Figure 5.16](#). The variation for both silt loam and clay loam were greater than that observed for the other soil types. Along with silt loam and clay loam having more variation, they have both been observed to have higher sediment yield, along with a decreased efficiency. These observations and distinct groupings can be further seen in [Figure 5.17](#). This figure further validates that clay loam and silt loam experience similar results compared to the other soil types. The magnitude of erosion observed can be correlated to the properties of the soil components and the retention methods of these devices explained prior.

For the numerical simulations performed without impoundments, loam was observed to have the highest amount of sediment yield followed by clay loam and silt loam. These three types of soil experience more erosion than the other soil types because they have substantially

Table 5.7: Summary of Soil Composition Breakdown of the P-Factor for Silt Fences

Soil	Soil Composition	P-Factor
Clay Loam	Clay	0.93
	Silt	0.98
	Sand	0.00
Loam	Clay	0.92
	Silt	0.97
	Sand	0.01
Silt Clay Loam	Clay	0.92
	Silt	0.98
	Sand	0.00
Silt Clay	Clay	0.92
	Silt	0.98
	Sand	0.00
Silt Loam	Clay	0.92
	Silt	0.97
	Sand	0.01

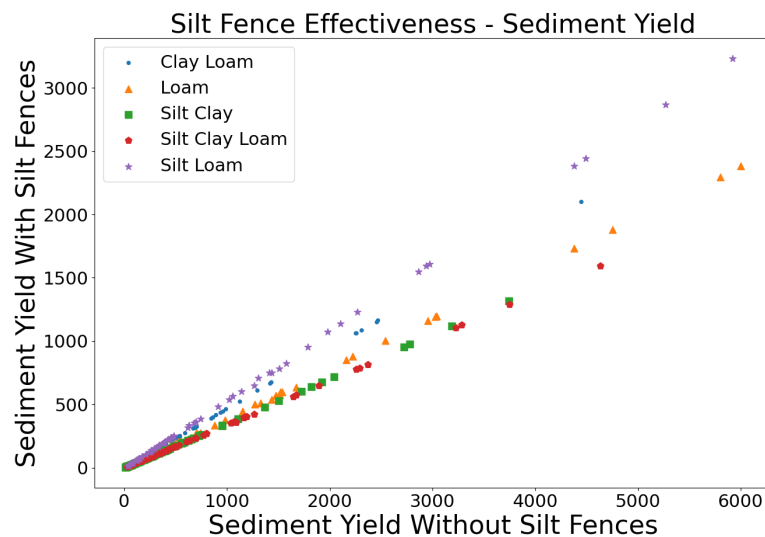


Figure 5.17: Silt Fence Effectiveness for Sediment Yield

more sand. As a result of its larger particle size, sand will erode easier than both clay and silt. Although loam has the greatest sediment yield in the numerical simulation performed without impoundments, the amount of soil eroded is drastically decreased through the utilization of these sediment control devices. The ability for loam to undergo this decrease in sediment yield is due to the capability for these sediment control devices to capture sand particles. The high levels of sand present in both clay loam and silt loam would suggest that these devices could successfully capture a significant amount of the eroded soil; however, these soils have the highest P-factor which indicates a lower efficiency.

The high levels of variability and decreased efficiency is a direct result of the properties of the soil components. For both silt loam and clay loam, a substantial amount of silt is present. Silt is a defining factor for determining the overall efficiency of these devices because they are unable to form stable aggregates that can be retained by the sediment control devices. Unlike silt, clay particles are able to form stable aggregates due to their surface charge [14]. The ability for these eroded clay particles to form stable aggregates enables them to be retained by erosion control practices, while silt is able to proceed through the gaps in these devices. Although silt clay and silt clay loam both have high levels of silt, the increased levels of clay content aid in the formation of aggregate. The silt contained in these soils will be incorporated into the aggregates created by the eroded clay particles.

Another key component that can explain the differences observed in the efficiency of these practices is the hydraulic conductivity of the soil. It has already been concluded that the type of soil is the primary component to determining the P-factor. A trend that has been observed through these various numerical simulations is that the hydraulic conductivity of the soil decreases as the runoff coefficient increases. This observed trend can be observed in [Figure 5.18](#). Hydraulic conductivity is the measurement that indicates the capability of fluid to be absorbed by the soil [9]. A high hydraulic conductivity indicates that a substantial amount of fluid can be infiltrated into the soil. A soil type that has a higher hydraulic conductivity will be able to infiltrate more water, resulting in a decrease in the amount of runoff. A decrease in the amount of runoff is crucial to reducing the amount of erosion experienced on a site because as the water that is moving across the surface of the soil

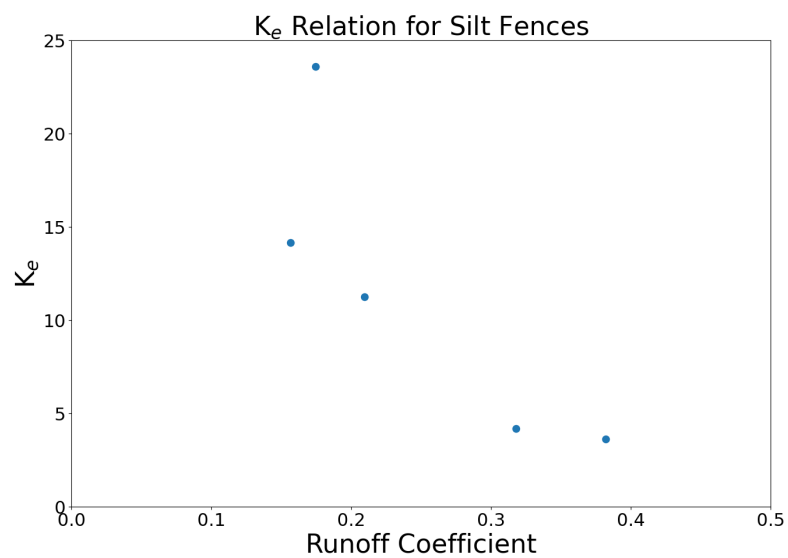


Figure 5.18: Hydraulic Conductivity compared to Runoff Coefficient for Silt Fences

increases the, probability that the first stage of erosion, detachment, is able to be achieved increases. This reinforces a conclusion drawn from the previous study: the runoff coefficient is an excellent indicator of erosivity [39].

To accurately compute the sediment yield and the P-factors for the numerical simulations with impoundments, an analysis of the various events was performed to determine empirical relationships. The empirical relationship developed between the sediment yield and the runoff coefficient for silt fences can be found in [Appendix C](#). These regression equations can aid in estimating the amount of sediment that will erode from a defined area that has implemented these sediment control devices for a given amount of rainfall. Along with the sediment yield, an empirical relationship was developed between the P-factor and the runoff coefficient for the silt fence. These regression equations can be seen in [Equation 5.6](#) through [Equation 5.10](#) and further observed in [Figure 5.19](#) through [Figure 5.23](#). For each of these equations the P-factor is represented as P , while the runoff coefficient is represented as RC .

$$\text{Clay Loam: } P = 0.503RC^{0.1317} \quad (r^2 = 0.8533) \quad (5.6)$$

$$\text{Loam: } P = 0.4094RC^{0.0561} \quad (r^2 = 0.8192) \quad (5.7)$$

$$\text{Silt Clay Loam: } P = 0.3499RC^{0.0373} \quad (r^2 = 0.7454) \quad (5.8)$$

$$\text{Silt Clay: } P = 0.3598RC^{0.0561} \quad (r^2 = 0.7876) \quad (5.9)$$

$$\text{Silt Loam: } P = 0.5884RC^{0.0902} \quad (r^2 = 0.8293) \quad (5.10)$$

These regression equations were only able to be generated for silt fences. The breakdown of the event data found almost no variation in the P-factor for straw-filled sediment tubes, and thus, did not lend itself to the generation of accurate regression equations. Although regression equations were not able to be generated for straw-filled sediment tubes, the P-factor of this practice can still be determined. The P-factor for this practice will be the P-factor

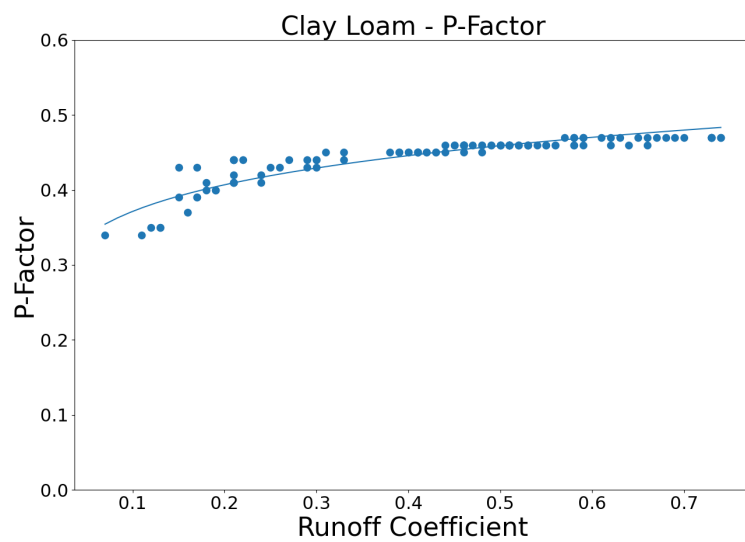


Figure 5.19: P-Factor Regressions - Clay Loam

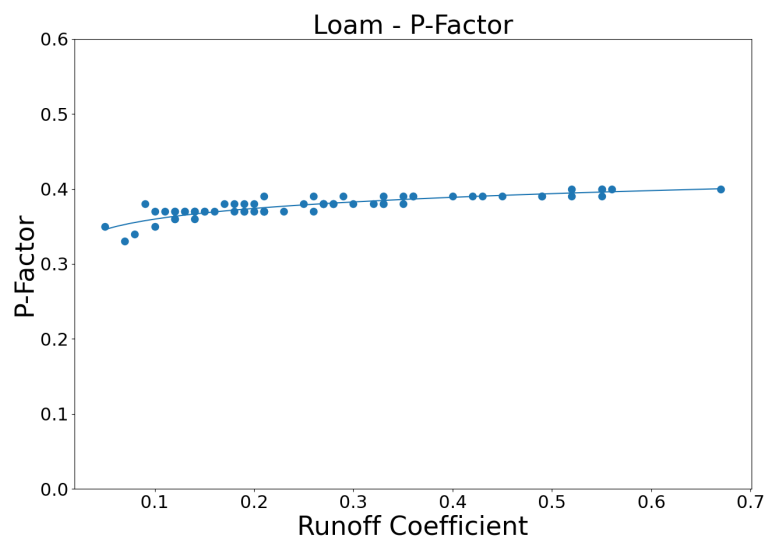


Figure 5.20: P-Factor Regressions - Loam

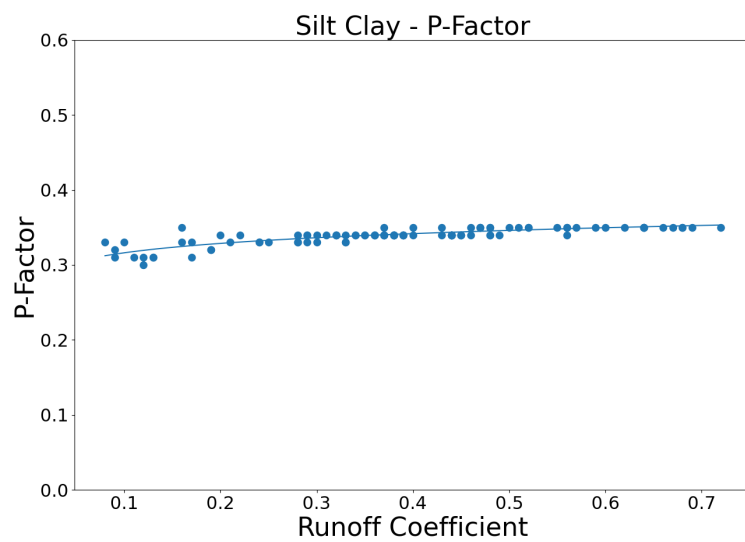


Figure 5.21: P-Factor Regressions - Silt Clay

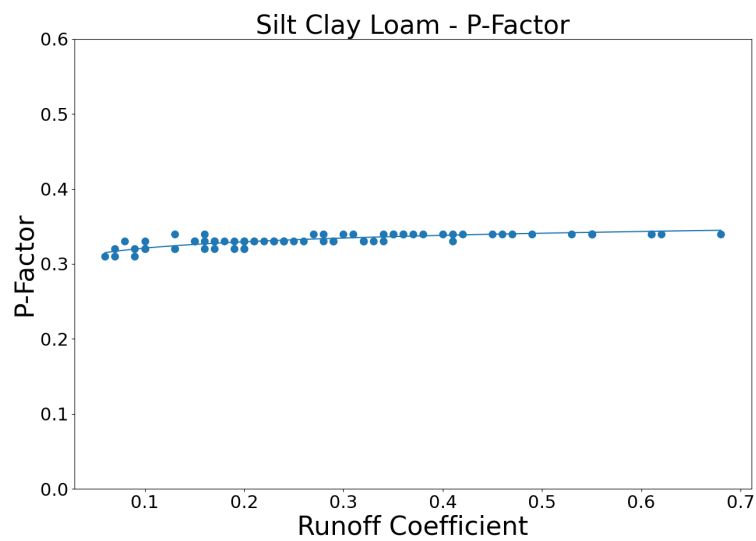


Figure 5.22: P-Factor Regressions - Silt Clay Loam

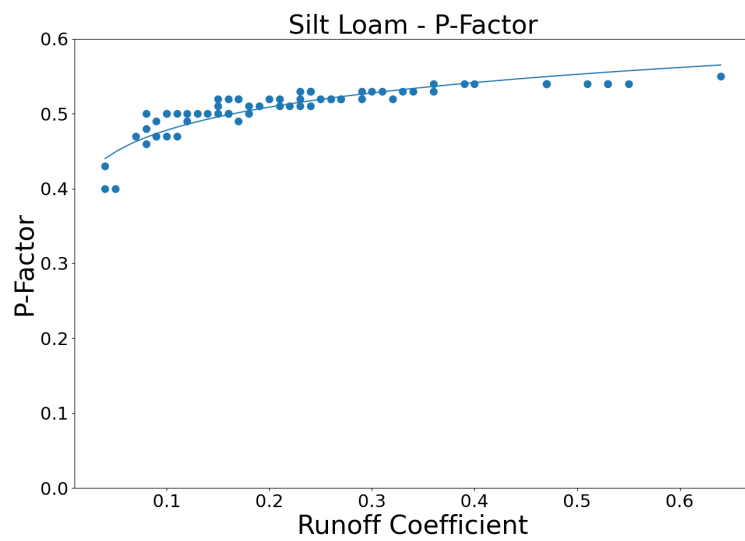


Figure 5.23: P-Factor Regressions - Silt Loam

that was calculated utilizing the data generated from the numerical simulations for each soil type.

The determination of these erosion control practice (P) factors is crucial because it will enable entities, whether in industry or academia, to estimate the amount of soil that is eroded from a site. A reference table of the P-factors for RUSLE determined in this study, generated specifically for the state of Tennessee, can be found in [Table 5.8](#).

Table 5.8: Reference Table

Practice	Soil	P-Value
Silt Fences	Clay Loam	0.46
	Silt Clay	0.35
	Silt Clay Loam	0.34
	Silt Loam	0.53
	Loam	0.39
Straw-Filled Sediment Tubes	Clay Loam	0.48
	Silt Clay	0.35
	Silt Clay Loam	0.35
	Silt Loam	0.55
	Loam	0.40

Chapter 6

Conclusion and Future Research

6.1 Conclusions

This study was conducted utilizing the generated hillslopes and watershed models for the Water Erosion Prediction Project (WEPP). For the completion of this study, 15 hillslopes models were calibrated, 20 watershed models were simulated without impoundments to determine the baseline erosion rates, and 40 watershed models were simulated to determine the efficiency of the sediment control devices (silt fences and straw-filled sediment tubes). These various numerical simulations encompassed different combinations of soil types and climate regions. From these numerical simulations, a reference table ([Table 5.8](#)) was generated for the different erosion control practice factors (P-factors) produced. The soil type observed to have the greatest efficiency with a P-factor of 0.34 for silt fences was silt clay, while the least level of reduction was achieved by the silt loam soil type with a P-factor of 0.55 for straw-filled sediment tubes. The range observed in these factors is representative of those found in literature and the previously conducted experiments [39, 18, 23]. Although the P-Factors for this study are observed to be within the ranges found in literature, they achieve a more narrow range of values. This narrower range could potentially be a result of the models being a more uniform and controlled environment, whereas physical experiments will suffer from a variety of additional influences including human error and changes in soil composition over subsequent runs. The factors found for this study can be directly inserted

into the revised universal soil loss equation (RUSLE) to estimate the total soil loss of a defined area.

The reference table ([Table 5.8](#)) was generated based upon the observation that the soil type was the primary element to influencing the P-factor and that the P-factor varied an insignificant amount across the different rainfall events for each soil type. This finding was contributed to two primary aspects, the soil composition and hydraulic conductivity. It was discovered that the best management practices analyzed in this study lack the ability to effectively retain smaller particles due to the nature of the retention for these sediment control devices. The inability to retain these smaller particles resulted in the sediment control devices being less effective at reducing the amount of sediment yield for silt loam and clay loam. The soil composition of silt clay and silt clay loam contributed to a high level of efficiency for the sediment control devices due to their large presence of clay. The clay particles in these soils were able to form stable aggregates with silt particles, and these aggregates were able to be retained by these practices. The trend observed pertaining to the hydraulic conductivity indicated that as the hydraulic conductivity decreases, the soil erosivity will increase.

Although these trends were apparent, they were not an exact correlation. The slight deviation of these trends can be explained through the length of the simulated time period. Due to the limitations of the WEPP simulations, each simulation had to be conducted for a full year. This extended length provides time for a multitude of events to occur. The frequency and duration of these events directly influences the moisture content, which impacts the ability of the runoff to infiltrate into the soil. Although soil composition and hydraulic conductivity both influence the amount of soil erosion, the moisture content can also contribute to the amount of sediment loss. If rainfall events happen in a condensed amount of time, the soil may not receive adequate time to dry out, resulting in the soil being saturated and unable to infiltrate runoff at its full potential. The lack of infiltration will ultimately increase the amount of water that is running across the soil as runoff, providing more opportunities for erosion to occur. Similar outcomes will occur if a rainfall event occurs over an extended duration because the soil will become oversaturated. Additionally, the rainfall events influence the soil composition over time. As a rainfall event occurs, erosion

will take place, and different size particles will erode at varying rates. Over time the percent of clay, silt, and sand will vary, resulting in mild fluctuations to the P-factor of both sediment control devices.

6.2 Future Research

This study can be easily built upon and continued. One recommended future study that could build upon the existing data would be to conduct these numerical simulations for various climate lengths, enabling a more complete understanding to be developed for how the composition of these soil types fluctuates over time and the corresponding influence this fluctuation has on the generated P-factors. Another avenue that could be pursued is broadening the study to incorporate more soil types and climate regions. Additional studies could generate new numerical simulations that incorporate more soil types. Doing so would provide P-factors for soils outside of the common soil types found in the state of Tennessee, and would allow the P-factors to be more broadly utilized across climate regions. This study was limited to silt fences and straw-filled sediment tubes due to the lack of slurry flow rates in literature. The data found in this study could be drastically expanded upon if additional physical experiments were performed utilizing the same uniform experimental set-up to find the different slurry flow rates of erosion control practices and sediment control devices. The regression equations generated could be utilized to find the baseline erosion and new numerical simulations could be generated for those practices.

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Appendix

A Calibration Data

Table A.1: Calibration Data

Soil Type	Clay Loam	Clay Loam	Clay Loam	Silty Clay	Silty Clay	Silty Clay	Silty Clay	Silty Clay	Silty Clay	Silty Clay	Silty Loam	Silty Loam	Silty Loam	Loam	Loam	Loam
	2.31	3.29	4.1	2.31	3.29	4.1	Loam 2.31	Loam 3.29	Loam 4.1	2.31	3.29	4.1	2.31	3.29	4.1	
Moisture Level	25	25	25	25	25	25	75	75	60	75	65	40	75	75	75	
K_i (kg·s/m ⁴)	1000000	500000	500000	1000000	400000	400000	1000000	1000000	400000	1000000	1000000	1000000	1000000	1000000	1000000	
K_r (s/m)	0.005	0.005	0.005	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.005	
τ_c (Pa)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	6.5	5.5	5.5	5.5	5.5	5.5	5.5	
K_e (mm/h)	2	4	6	2.5	4.5	6.5	8	13.32	13.32	11	16.06	16.06	14	25	37.5	
Runoff (in)	0.31	0.44	0.54	0.28	0.43	0.55	0.13	0.24	0.31	0.09	0.12	0.14	0.1	0.14	0.14	
Runoff Volume (L)	26.33	37.38	45.87	23.79	36.53	46.72	11.04	20.39	26.33	7.65	10.19	11.89	8.50	11.89	11.89	
Sediment (kg/m ²)	0.11	0.15	0.25	0.10	0.12	0.17	0.05	0.06	0.08	0.03	0.06	0.09	0.03	0.07	0.09	
Sediment (kg)	0.37	0.50	0.85	0.33	0.41	0.57	0.15	0.21	0.25	0.10	0.20	0.28	0.11	0.22	0.29	
Percent Sediment	-4.69	-11.01	22.58	-16.39	-17.39	-22.04	29.28	23.94	18.88	-25.12	3.31	19.45	40.39	1.86	17.26	
Percent Runoff	11.21	10.85	9.14	10.22	8.94	7.73	-24.98	-2.73	0.78	-31.43	-14.12	-4.55	-24.15	1.65	-5.61	

B Event Data

In this section, the breakdown of events for numerical simulations generated in WEPP is found. These events have been generated for the watershed with and without impoundments. The two impoundments included in these analyses are silt fences and straw-filled sediment tubes. These events were generated for each combination of soil type and climate region contained in this study. The events have been grouped into 60 individual simulation set-ups.

Table B.1: Event Data for out Impoundments - Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	227.5	0.51	1122.6
2	22	1	1	22	86.6	703.8	0.73	2251.3
3	29	1	1	29	23.3	135.7	0.52	299.8
4	21	2	1	52	34.7	176.1	0.46	512.2
7	12	3	1	71	15.0	24.8	0.15	21.6
8	8	4	1	98	25.0	172.8	0.62	343.6
9	13	4	1	103	10.1	21.6	0.19	30.9
10	14	4	1	104	45.2	294.6	0.59	666.7
11	25	4	1	115	19.8	87.6	0.40	108.0
12	4	5	1	124	23.2	113.6	0.44	252.0
13	5	5	1	125	61.9	478.2	0.70	985.7
14	19	5	1	139	18.4	93.3	0.46	120.7
15	31	5	1	151	8.9	11.8	0.12	11.2
16	20	6	1	171	25.1	129.9	0.47	134.8
17	10	7	1	191	24.9	127.7	0.46	207.4
18	17	7	1	198	11.5	26.9	0.21	49.2
19	20	7	1	201	23.4	129.7	0.50	168.1
20	5	8	1	217	16.9	42.1	0.22	43.3
21	9	8	1	221	29.7	165.7	0.50	322.5
22	18	8	1	230	10.2	18.7	0.17	33.7
23	24	8	1	236	15.6	49.9	0.29	62.7
24	1	9	1	244	9.8	18.8	0.17	27.1
25	2	9	1	245	44.4	311.7	0.63	463.2
26	26	9	1	269	43.6	279.0	0.58	469.2
27	27	9	1	270	95.7	780.7	0.73	4443.9
28	10	10	1	283	27.8	164.9	0.53	466.7
29	19	10	1	292	30.6	161.8	0.48	328.6
30	25	10	1	298	26.1	127.5	0.44	292.9
31	12	11	1	316	36.0	236.2	0.59	702.8
32	13	12	1	347	9.9	26.9	0.24	65.9
33	22	12	1	356	10.7	21.4	0.18	19.7
34	24	12	1	358	10.2	21.9	0.19	42.0
35	28	12	1	362	29.4	215.8	0.66	531.7
36	31	12	1	365	19.7	88.8	0.41	167.9

Table B.2: Event Data for out Impoundments - Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
37	9	1	1	9	31.6	161.0	0.46	690.0
38	22	1	1	22	69.4	533.4	0.69	1418.0
39	29	1	1	29	18.4	88.8	0.43	159.2
43	5	4	1	95	36.1	223.6	0.56	842.5
44	13	4	1	103	14.9	43.4	0.26	43.1
45	18	4	1	108	20.8	94.2	0.41	285.7
46	19	4	1	109	57.7	437.8	0.68	890.2
47	28	4	1	118	16.3	69.8	0.39	76.5
48	19	5	1	139	24.2	124.3	0.46	121.7
49	31	5	1	151	20.9	94.2	0.41	169.6
50	15	6	1	166	11.4	26.7	0.21	48.5
51	29	6	1	180	20.9	100.1	0.43	154.4
52	20	7	1	201	15.0	27.8	0.17	27.3
53	25	7	1	206	30.5	172.2	0.51	339.1
54	3	8	1	215	8.7	12.2	0.13	16.9
55	5	8	1	217	13.6	32.0	0.21	37.4
56	18	8	1	230	30.5	178.6	0.53	239.0
57	30	8	1	242	30.0	154.3	0.46	194.0
58	31	8	1	243	60.0	444.9	0.67	2308.4
59	1	9	1	244	21.2	116.6	0.50	394.6
60	13	9	1	256	23.5	77.7	0.30	225.0
61	27	9	1	270	19.7	83.1	0.38	250.0
62	18	10	1	291	28.1	158.3	0.51	403.6
63	23	10	1	296	17.2	77.5	0.41	164.6
64	8	11	1	312	11.4	19.5	0.15	24.2
65	2	12	1	336	9.3	22.0	0.21	34.9
68	24	12	1	358	24.6	158.4	0.58	532.7

Table B.3: Event Data for out Impoundments - Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
69	9	1	1	9	41.8	229.46	0.49	959.0
70	22	1	1	22	96.2	790.56	0.74	2466.8
71	14	2	1	45	25.5	144.79	0.51	353.8
72	24	2	1	55	36.3	185.75	0.46	341.1
73	1	3	1	60	21.8	139.83	0.58	215.4
75	7	3	1	66	20.6	96.27	0.42	171.0
76	20	3	1	79	16.6	39.45	0.21	37.0
77	18	4	1	108	30.2	215.59	0.64	401.0
78	19	4	1	109	11.8	33.20	0.25	54.8
79	25	4	1	115	56.3	387.12	0.62	693.0
80	2	5	1	122	22.7	115.17	0.46	157.7
81	4	5	1	124	8.6	22.69	0.24	36.2
82	7	5	1	127	31.1	189.60	0.55	539.3
83	19	5	1	139	81.4	664.52	0.74	1430.9
84	31	5	1	151	24.7	161.33	0.59	274.3
85	20	6	1	171	9.0	11.27	0.11	12.0
86	19	7	1	200	31.0	186.94	0.54	259.7
87	30	7	1	211	27.0	147.34	0.49	217.9
88	4	8	1	216	14.5	46.01	0.29	99.8
89	22	8	1	234	27.0	155.45	0.52	225.0
90	7	9	1	250	20.5	75.09	0.33	85.8
91	21	9	1	264	36.7	224.28	0.55	502.8
92	10	10	1	283	13.3	44.52	0.30	95.2
93	12	10	1	285	19.9	87.06	0.39	138.6
94	18	10	1	291	16.0	11.66	0.07	7.1
95	3	11	1	307	13.7	44.88	0.30	90.2
96	8	11	1	312	49.2	356.72	0.65	538.1
97	2	12	1	336	49.1	331.62	0.61	591.0
100	22	12	1	356	37.5	198.51	0.48	314.8
101	28	12	1	362	31.7	180.24	0.51	264.5

Table B.4: Event Data for out Impoundments - Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
102	9	1	1	9	37.6	208.90	0.50	937.7
103	22	1	1	22	87.7	713.62	0.73	2255.3
104	29	1	1	29	20.8	111.55	0.48	225.8
108	5	4	1	95	21.1	131.53	0.56	219.6
109	13	4	1	103	37.6	237.38	0.57	862.8
110	19	4	1	109	16.9	61.75	0.33	68.3
111	2	5	1	122	26.1	152.55	0.53	536.0
112	3	5	1	123	74.5	604.86	0.73	1293.0
113	5	5	1	125	20.3	113.84	0.51	158.4
114	22	5	1	142	9.0	12.76	0.13	12.2
115	13	6	1	164	28.0	157.37	0.51	218.2
116	28	6	1	179	23.9	119.17	0.45	213.4
117	14	7	1	195	11.6	27.62	0.21	50.9
118	19	7	1	200	21.9	108.83	0.45	153.5
119	4	8	1	216	16.4	38.33	0.21	38.8
120	11	8	1	223	30.4	170.50	0.51	338.0
121	22	8	1	234	9.6	18.85	0.18	28.5
122	28	8	1	240	15.1	44.56	0.27	56.6
123	7	9	1	250	37.4	238.84	0.58	360.0
124	27	9	1	270	36.6	214.70	0.53	326.0
125	10	10	1	283	63.0	464.32	0.66	2453.7
126	11	10	1	284	23.0	132.12	0.52	382.1
127	24	10	1	297	25.4	86.80	0.31	113.5
128	8	11	1	312	23.5	108.30	0.42	366.9
130	2	12	1	336	18.6	82.81	0.40	205.0
131	22	12	1	356	8.3	15.10	0.16	34.0

Table B.5: Event Data for out Impoundments - Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	50.13	0.11	416.5
2	22	1	1	22	86.6	524.68	0.55	4751.3
3	29	1	1	29	23.3	31.95	0.12	115.6
4	21	2	1	52	34.7	105.73	0.27	1512.2
7	8	4	1	98	25.0	58.11	0.21	300.9
8	14	4	1	104	45.2	199.13	0.40	1537.2
9	4	5	1	124	23.2	49.53	0.19	269.1
10	5	5	1	125	61.9	310.69	0.45	1520.3
11	10	7	1	191	24.9	53.54	0.19	336.7
12	20	7	1	201	23.4	42.87	0.17	173.9
13	9	8	1	221	29.7	47.27	0.14	185.8
14	2	9	1	245	44.4	141.63	0.29	536.5
15	26	9	1	269	43.6	102.92	0.21	357.8
16	27	9	1	270	95.7	708.06	0.67	6001.0
18	10	10	1	283	27.8	83.37	0.27	549.1
19	19	10	1	292	30.6	110.78	0.33	980.0
20	25	10	1	298	26.1	60.67	0.21	491.4
21	12	11	1	316	36.0	111.93	0.28	519.6
22	28	12	1	362	29.4	114.21	0.35	448.5

Table B.6: Event Data for out Impoundments - Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	17.26	0.05	166.4
24	22	1	1	22	69.4	375.60	0.49	3038.0
26	5	4	1	95	36.1	139.14	0.35	1148.3
27	18	4	1	108	20.8	32.89	0.14	186.0
28	19	4	1	109	57.7	271.53	0.42	1270.1
29	31	5	1	151	20.9	32.64	0.14	186.8
30	29	6	1	180	20.9	23.32	0.10	84.9
31	25	7	1	206	30.5	51.45	0.15	210.1
32	18	8	1	230	30.5	30.29	0.09	102.3
33	31	8	1	243	60.0	364.78	0.55	2952.4
34	1	9	1	244	21.2	54.97	0.23	285.6
35	13	9	1	256	23.5	46.20	0.18	320.2
36	27	9	1	270	19.7	30.56	0.14	192.3
37	18	10	1	291	28.1	49.06	0.16	193.6
38	24	12	1	358	24.6	88.97	0.33	474.8

Table B.7: Event Data for out Impoundments - Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
39	9	1	1	9	41.8	61.56	0.13	740.2
40	22	1	1	22	96.2	601.02	0.56	5798.8
42	14	2	1	45	25.5	156.90	0.55	156.9
43	24	2	1	55	36.3	1645.80	4.08	1645.8
48	18	4	1	108	30.2	100.26	0.30	525.6
49	25	4	1	115	56.3	270.60	0.43	2158.3
50	2	5	1	122	22.7	16.41	0.07	49.0
51	7	5	1	127	31.1	109.96	0.32	878.2
52	19	5	1	139	81.4	466.78	0.52	2542.7
53	31	5	1	151	24.7	28.37	0.10	72.4
54	19	7	1	200	31.0	95.95	0.28	1672.2
55	30	7	1	211	27.0	63.18	0.21	408.3
56	22	8	1	234	27.0	62.46	0.21	263.6
57	21	9	1	264	36.7	99.92	0.25	392.6
58	8	11	1	312	49.2	178.54	0.33	698.3
59	2	12	1	336	49.1	143.93	0.26	522.4
63	22	12	1	356	37.5	149.64	0.36	1471.8
64	28	12	1	362	31.7	99.28	0.28	708.5

Table B.8: Event Data for out Impoundments - Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
65	9	1	1	9	37.6	54.37	0.13	481.7
67	22	1	1	22	87.7	532.48	0.55	4377.9
69	29	1	1	29	20.8	17.56	0.08	50.9
70	5	4	1	95	21.1	27.27	0.12	118.2
71	13	4	1	103	37.6	148.42	0.36	1324.1
72	2	5	1	122	26.1	76.42	0.26	500.0
73	3	5	1	123	74.5	431.73	0.52	2223.1
75	13	6	1	164	28.0	85.23	0.27	1436.7
76	28	6	1	179	23.9	48.42	0.18	295.4
77	19	7	1	200	21.9	29.81	0.12	117.6
78	11	8	1	223	30.4	51.52	0.15	213.0
79	7	9	1	250	37.4	82.81	0.20	324.8
80	27	9	1	270	36.6	50.19	0.12	164.0
81	10	10	1	283	63.0	345.62	0.49	3027.6
82	11	10	1	284	23.0	70.07	0.27	385.9
83	24	10	1	297	25.4	55.16	0.20	417.3
84	8	11	1	312	23.5	48.80	0.19	370.3

Table B.9: Event Data for out Impoundments - Silt Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	92.06	0.21	531.3
2	22	1	1	22	86.6	584.76	0.61	3226.0
3	29	1	1	29	23.3	60.84	0.24	162.4
4	21	2	1	52	34.7	112.12	0.29	773.0
8	8	4	1	98	25.0	67.21	0.24	257.9
9	14	4	1	104	45.2	210.48	0.42	1161.1
10	25	4	1	115	19.8	13.57	0.06	27.3
11	4	5	1	124	23.2	50.97	0.20	218.9
12	5	5	1	125	61.9	334.45	0.49	1169.0
13	10	7	1	191	24.9	67.11	0.24	267.2
14	20	7	1	201	23.4	50.46	0.19	150.9
15	9	8	1	221	29.7	64.23	0.19	160.3
16	2	9	1	245	44.4	173.94	0.35	468.3
17	26	9	1	269	43.6	137.05	0.28	341.0
18	27	9	1	270	95.7	720.66	0.68	4632.3
20	10	10	1	283	27.8	99.72	0.32	487.6
21	19	10	1	292	30.6	122.46	0.36	798.3
22	25	10	1	298	26.1	72.51	0.25	348.3
23	12	11	1	316	36.0	143.58	0.36	488.7
24	28	12	1	362	29.4	151.76	0.47	433.1
25	31	12	1	365	19.7	33.41	0.15	77.5

Table B.10: Event Data for out Impoundments - Silt Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
26	9	1	1	9	31.6	35.09	0.10	211.5
27	22	1	1	22	69.4	426.48	0.55	2259.5
28	29	1	1	29	18.4	20.54	0.10	41.1
30	5	4	1	95	36.1	148.34	0.37	797.9
31	18	4	1	108	20.8	37.17	0.16	154.2
32	19	4	1	109	57.7	296.50	0.46	1035.7
33	31	5	1	151	20.9	39.59	0.17	156.0
34	29	6	1	180	20.9	30.14	0.13	77.3
35	25	7	1	206	30.5	67.51	0.20	171.2
36	18	8	1	230	30.5	51.13	0.15	119.4
37	30	8	1	242	30.0	27.26	0.08	52.7
38	31	8	1	243	60.0	369.12	0.55	2292.1
39	1	9	1	244	21.2	74.37	0.32	288.5
43	13	9	1	256	23.5	52.83	0.20	269.9
44	27	9	1	270	19.7	37.70	0.17	174.9
45	18	10	1	291	28.1	73.46	0.24	213.2
46	23	10	1	296	17.2	16.60	0.09	44.0
50	24	12	1	358	24.6	111.31	0.41	437.8

Table B.11: Event Data for out Impoundments - Silt Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
51	9	1	1	9	41.8	80.46	0.17	495.8
52	22	1	1	22	96.2	659.46	0.62	3750.4
53	14	2	1	45	25.5	64.12	0.23	184.4
54	24	2	1	55	36.3	120.12	0.30	691.0
55	1	3	1	60	21.8	31.27	0.13	54.2
57	7	3	1	66	20.6	20.65	0.09	47.7
58	18	4	1	108	30.2	107.77	0.32	433.6
59	25	4	1	115	56.3	283.80	0.45	1643.1
60	2	5	1	122	22.7	24.64	0.10	54.3
61	7	5	1	127	31.1	117.69	0.34	699.4
62	19	5	1	139	81.4	495.70	0.55	1896.1
63	31	5	1	151	24.7	45.21	0.16	86.5
64	19	7	1	200	31.0	98.47	0.29	1264.7
65	30	7	1	211	27.0	69.78	0.23	325.5
68	22	8	1	234	27.0	76.86	0.26	235.2
69	21	9	1	264	36.7	127.08	0.31	368.0
70	12	10	1	285	19.9	14.58	0.07	33.2
71	8	11	1	312	49.2	223.81	0.41	636.6
72	2	12	1	336	49.1	191.02	0.35	475.1
77	22	12	1	356	37.5	164.55	0.40	1192.7
78	28	12	1	362	31.7	119.19	0.34	608.6

Table B.12: Event Data for out Impoundments - Silt Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
79	9	1	1	9	37.6	72.64	0.17	402.8
80	22	1	1	22	87.7	593.56	0.61	3285.0
81	29	1	1	29	20.8	41.65	0.18	102.9
83	5	4	1	95	21.1	36.61	0.16	115.7
84	13	4	1	103	37.6	156.84	0.38	1067.3
85	2	5	1	122	26.1	83.07	0.29	409.7
86	3	5	1	123	74.5	452.20	0.55	1670.8
87	5	5	1	125	20.3	16.59	0.07	25.2
88	13	6	1	164	28.0	85.85	0.28	1087.5
89	28	6	1	179	23.9	53.31	0.20	237.1
90	19	7	1	200	21.9	36.98	0.15	109.1
91	11	8	1	223	30.4	69.58	0.21	177.4
92	7	9	1	250	37.4	111.82	0.27	271.5
93	27	9	1	270	36.6	82.58	0.20	187.3
94	10	10	1	283	63.0	371.86	0.53	2368.7
95	11	10	1	284	23.0	84.30	0.33	355.6
96	24	10	1	297	25.4	63.33	0.22	353.1
97	8	11	1	312	23.5	58.99	0.23	329.8
100	2	12	1	336	18.6	25.81	0.13	74.7

Table B.13: Event Data for out Impoundments - Silt Clay - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	177.72	0.40	755.9
2	22	1	1	22	86.6	654.72	0.68	2720.5
3	29	1	1	29	23.3	101.20	0.39	215.0
4	21	2	1	52	34.7	143.26	0.37	400.9
7	8	4	1	98	25.0	123.40	0.44	229.6
8	14	4	1	104	45.2	260.05	0.52	952.0
9	25	4	1	115	19.8	55.18	0.25	67.6
10	4	5	1	124	23.2	87.13	0.34	260.3
11	5	5	1	125	61.9	424.90	0.62	1103.1
12	19	5	1	139	18.4	59.32	0.29	67.4
13	20	6	1	171	25.1	89.77	0.32	79.4
14	10	7	1	191	24.9	103.31	0.37	227.9
15	17	7	1	198	11.5	16.38	0.13	28.3
16	20	7	1	201	23.4	101.67	0.39	159.4
17	5	8	1	217	16.9	18.96	0.10	19.2
18	9	8	1	221	29.7	143.47	0.44	256.3
19	24	8	1	236	15.6	34.85	0.20	34.2
20	2	9	1	245	44.4	277.81	0.56	423.0
21	26	9	1	269	43.6	251.90	0.52	372.8
22	27	9	1	270	95.7	762.80	0.72	3742.1
23	10	10	1	283	27.8	151.73	0.49	557.1
24	19	10	1	292	30.6	153.39	0.45	725.3
25	25	10	1	298	26.1	115.95	0.40	365.2
26	12	11	1	316	36.0	220.52	0.55	564.1
27	13	12	1	347	9.9	21.24	0.19	50.3
28	22	12	1	356	10.7	12.57	0.11	10.0
29	24	12	1	358	10.2	18.72	0.17	30.9
30	28	12	1	362	29.4	208.00	0.64	441.8
31	31	12	1	365	19.7	82.01	0.38	133.7

Table B.14: Event Data for out Impoundments - Silt Clay - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
32	9	1	1	9	31.6	109.62	0.31	404.9
33	22	1	1	22	69.4	489.98	0.64	1822.6
34	29	1	1	29	18.4	59.55	0.29	94.2
38	5	4	1	95	36.1	189.25	0.47	649.4
39	13	4	1	103	14.9	14.99	0.09	16.1
40	18	4	1	108	20.8	68.84	0.30	186.4
41	19	4	1	109	57.7	383.10	0.60	955.1
42	28	4	1	118	16.3	29.17	0.16	26.6
43	19	5	1	139	24.2	75.40	0.28	65.1
44	31	5	1	151	20.9	73.32	0.32	200.2
45	15	6	1	166	11.4	14.80	0.12	25.3
46	29	6	1	180	20.9	77.56	0.33	129.4
47	25	7	1	206	30.5	149.78	0.44	267.4
48	5	8	1	217	13.6	12.89	0.09	13.4
49	18	8	1	230	30.5	145.65	0.43	207.1
50	30	8	1	242	30.0	122.67	0.37	139.2
51	31	8	1	243	60.0	428.04	0.64	1920.4
52	1	9	1	244	21.2	106.77	0.45	310.4
53	13	9	1	256	23.5	73.37	0.28	276.3
54	27	9	1	270	19.7	72.05	0.33	191.1
55	18	10	1	291	28.1	142.38	0.46	311.5
56	23	10	1	296	17.2	62.44	0.33	118.5
57	2	12	1	336	9.3	19.68	0.19	22.7
60	24	12	1	358	24.6	152.53	0.56	442.3

Table B.15: Event Data for out Impoundments - Silt Clay - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
61	9	1	1	9	41.8	172.78	0.37	622.5
62	22	1	1	22	96.2	736.72	0.69	3187.8
63	14	2	1	45	25.5	108.20	0.38	246.6
64	24	2	1	55	36.3	150.86	0.37	411.5
65	1	3	1	60	21.8	93.68	0.39	121.1
67	7	3	1	66	20.6	62.97	0.28	99.3
68	18	4	1	108	30.2	160.95	0.48	364.1
69	25	4	1	115	56.3	347.79	0.56	1366.7
70	2	5	1	122	22.7	75.85	0.30	99.2
71	7	5	1	127	31.1	165.38	0.48	586.3
72	19	5	1	139	81.4	608.60	0.67	1723.6
73	31	5	1	151	24.7	123.87	0.45	180.5
74	19	7	1	200	31.0	150.69	0.44	217.8
75	30	7	1	211	27.0	117.86	0.39	225.4
76	4	8	1	216	14.5	33.78	0.21	66.8
77	22	8	1	234	27.0	130.99	0.44	217.8
78	7	9	1	250	20.5	50.56	0.22	54.8
79	21	9	1	264	36.7	203.70	0.50	410.7
80	10	10	1	283	13.3	35.94	0.24	66.3
81	12	10	1	285	19.9	71.53	0.32	98.8
82	3	11	1	307	13.7	36.78	0.24	63.8
83	8	11	1	312	49.2	324.60	0.59	496.2
84	2	12	1	336	49.1	310.38	0.57	490.7
87	22	12	1	356	37.5	191.78	0.46	484.0
88	28	12	1	362	31.7	165.63	0.47	287.5

Table B.16: Event Data for out Impoundments - Silt Clay - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
89	9	1	1	9	37.6	160.04	0.38	619.2
90	22	1	1	22	87.7	665.06	0.68	2780.5
91	29	1	1	29	20.8	81.45	0.35	151.7
94	5	4	1	95	21.1	82.79	0.35	147.0
95	13	4	1	103	37.6	199.35	0.48	676.6
96	19	4	1	109	16.9	29.23	0.16	31.1
97	2	5	1	122	26.1	123.35	0.43	390.8
98	3	5	1	123	74.5	548.24	0.66	1499.7
99	5	5	1	125	20.3	77.41	0.34	91.7
100	13	6	1	164	28.0	118.35	0.38	249.7
101	28	6	1	179	23.9	95.90	0.36	264.8
102	14	7	1	195	11.6	16.92	0.13	29.5
103	19	7	1	200	21.9	86.37	0.36	146.3
104	4	8	1	216	16.4	15.36	0.08	14.7
105	11	8	1	223	30.4	148.27	0.44	270.4
106	28	8	1	240	15.1	28.48	0.17	29.6
107	7	9	1	250	37.4	210.16	0.51	327.9
108	27	9	1	270	36.6	188.94	0.47	247.4
109	10	10	1	283	63.0	446.74	0.64	2041.3
110	11	10	1	284	23.0	122.76	0.48	388.1
111	24	10	1	297	25.4	82.19	0.29	337.7
112	8	11	1	312	23.5	98.55	0.38	292.0
113	2	12	1	336	18.6	74.51	0.36	155.6
114	22	12	1	356	8.3	11.33	0.12	22.0

Table B.17: Event Data for out Impoundments - Silt Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	77.02	0.17	616.6
2	22	1	1	22	86.6	512.15	0.53	4376.8
3	29	1	1	29	23.3	22.09	0.09	60.7
4	21	2	1	52	34.7	100.41	0.26	1436.2
7	8	4	1	98	25.0	34.00	0.12	170.7
8	14	4	1	104	45.2	179.33	0.36	1783.7
9	4	5	1	124	23.2	33.37	0.13	210.5
10	5	5	1	125	61.9	272.47	0.40	1305.8
11	10	7	1	191	24.9	43.17	0.16	297.4
12	20	7	1	201	23.4	30.91	0.12	129.2
13	9	8	1	221	29.7	30.51	0.09	123.2
14	2	9	1	245	44.4	118.73	0.24	480.9
15	26	9	1	269	43.6	80.59	0.17	287.4
16	27	9	1	270	95.7	679.31	0.64	5923.1
18	10	10	1	283	27.8	70.95	0.23	463.6
19	19	10	1	292	30.6	103.23	0.30	913.2
20	25	10	1	298	26.1	54.60	0.19	442.2
21	12	11	1	316	36.0	97.36	0.24	453.6
22	28	12	1	362	29.4	103.04	0.32	419.8

Table B.18: Event Data for out Impoundments - Silt Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	27.43	0.08	256.6
24	22	1	1	22	69.4	364.01	0.47	2974.1
25	5	4	1	95	36.1	123.24	0.31	1019.7
26	18	4	1	108	20.8	20.79	0.09	117.6
27	19	4	1	109	57.7	231.75	0.36	1052.4
28	31	5	1	151	20.9	22.37	0.10	128.0
29	29	6	1	180	20.9	11.85	0.05	44.0
30	25	7	1	206	30.5	34.11	0.10	146.4
31	18	8	1	230	30.5	13.96	0.04	45.5
32	31	8	1	243	60.0	338.01	0.51	2863.0
33	1	9	1	244	21.2	50.95	0.22	263.2
34	13	9	1	256	23.5	39.55	0.15	274.2
35	27	9	1	270	19.7	23.98	0.11	150.9
36	18	10	1	291	28.1	35.42	0.11	142.6
37	24	12	1	358	24.6	80.30	0.29	428.5

Table B.19: Event Data for out Impoundments - Silt Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
38	9	1	1	9	41.8	72.43	0.16	744.0
39	22	1	1	22	96.2	583.41	0.55	5265.8
40	14	2	1	45	25.5	20.85	0.07	83.5
41	24	2	1	55	36.3	108.10	0.27	1577.1
44	18	4	1	108	30.2	70.24	0.21	373.3
45	25	4	1	115	56.3	246.36	0.39	2106.5
46	7	5	1	127	31.1	94.52	0.27	699.7
47	19	5	1	139	81.4	423.76	0.47	2267.2
48	31	5	1	151	24.7	12.32	0.04	30.9
49	19	7	1	200	31.0	86.60	0.25	1509.3
50	30	7	1	211	27.0	53.03	0.18	388.8
51	22	8	1	234	27.0	48.36	0.16	208.7
52	21	9	1	264	36.7	81.52	0.20	338.6
53	8	11	1	312	49.2	159.30	0.29	630.1
54	2	12	1	336	49.1	125.35	0.23	452.7
58	22	12	1	356	37.5	143.40	0.34	1410.5
59	28	12	1	362	31.7	92.21	0.26	682.5

Table B.20: Event Data for out Impoundments - Silt Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
60	9	1	1	9	37.6	63.38	0.15	482.3
61	22	1	1	22	87.7	519.67	0.53	4490.3
65	13	4	1	103	37.6	135.71	0.33	1139.7
66	2	5	1	122	26.1	60.27	0.21	392.6
67	3	5	1	123	74.5	387.05	0.47	1978.1
68	13	6	1	164	28.0	73.57	0.24	1264.7
69	28	6	1	179	23.9	37.61	0.14	246.1
70	19	7	1	200	21.9	20.58	0.08	79.9
71	11	8	1	223	30.4	35.03	0.10	142.2
72	7	9	1	250	37.4	62.95	0.15	241.2
73	27	9	1	270	36.6	34.18	0.08	113.9
74	10	10	1	283	63.0	330.04	0.47	2936.8
75	11	10	1	284	23.0	59.67	0.23	329.7
76	24	10	1	297	25.4	49.86	0.18	377.2
77	8	11	1	312	23.5	43.52	0.17	330.2

Table B.21: Event Data for Silt Fences - Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	227.2	0.51	521.8
2	22	1	1	22	86.6	703.6	0.73	1061.7
3	29	1	1	29	23.3	135.4	0.52	137.1
4	21	2	1	52	34.7	175.8	0.46	236.4
7	12	3	1	71	15.0	24.8	0.15	9.2
8	8	4	1	98	25.0	172.5	0.62	158.6
9	13	4	1	103	10.1	21.5	0.19	12.3
10	14	4	1	104	45.2	294.7	0.59	312.8
11	25	4	1	115	19.8	87.5	0.40	48.5
12	4	5	1	124	23.2	113.3	0.44	114.4
13	5	5	1	125	61.9	478.3	0.70	464.5
14	19	5	1	139	18.4	93.2	0.46	54.5
15	31	5	1	151	8.9	11.8	0.12	3.9
16	20	6	1	171	25.1	129.9	0.47	61.8
17	10	7	1	191	24.9	127.5	0.46	94.6
18	17	7	1	198	11.5	26.9	0.21	20.4
19	20	7	1	201	23.4	129.5	0.50	76.7
20	5	8	1	217	16.9	42.1	0.22	19.0
21	9	8	1	221	29.7	165.4	0.50	148.6
22	18	8	1	230	10.2	18.7	0.16	13.1
23	24	8	1	236	15.6	49.8	0.29	27.3
24	1	9	1	244	9.8	18.8	0.17	10.7
25	2	9	1	245	44.4	311.7	0.63	217.2
26	26	9	1	269	43.6	278.7	0.58	218.9
27	27	9	1	270	95.7	780.8	0.73	2100.6
28	10	10	1	283	27.8	164.6	0.53	215.0
29	19	10	1	292	30.6	161.5	0.48	151.3
30	25	10	1	298	26.1	127.2	0.44	133.6
31	12	11	1	316	36.0	236.0	0.59	326.9
32	13	12	1	347	9.9	26.9	0.24	27.4
33	22	12	1	356	10.7	21.4	0.18	8.0
34	24	12	1	358	10.2	21.9	0.19	16.9
35	28	12	1	362	29.4	215.5	0.66	246.9
36	31	12	1	365	19.7	88.9	0.41	75.9

Table B.22: Event Data for Silt Fences - Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
37	9	1	1	9	31.6	160.8	0.46	317.6
38	22	1	1	22	69.4	533.5	0.69	668.3
39	29	1	1	29	18.4	88.8	0.43	71.9
43	5	4	1	95	36.1	223.3	0.56	391.5
44	13	4	1	103	14.9	43.4	0.26	18.7
45	18	4	1	108	20.8	94.3	0.41	129.5
46	19	4	1	109	57.7	437.9	0.68	419.1
47	28	4	1	118	16.3	69.8	0.39	34.1
48	19	5	1	139	24.2	124.3	0.46	55.7
49	31	5	1	151	20.9	94.2	0.41	76.8
50	15	6	1	166	11.4	26.7	0.21	20.1
51	29	6	1	180	20.9	100.1	0.43	70.2
52	20	7	1	201	15.0	27.7	0.17	11.8
53	25	7	1	206	30.5	171.9	0.51	156.4
54	3	8	1	215	8.7	12.1	0.13	5.9
55	5	8	1	217	13.6	32.0	0.21	16.3
56	18	8	1	230	30.5	178.6	0.53	110.9
57	30	8	1	242	30.0	154.1	0.46	89.2
58	31	8	1	243	60.0	445.0	0.67	1087.7
59	1	9	1	244	21.2	116.6	0.50	180.6
60	13	9	1	256	23.5	77.5	0.30	99.9
61	27	9	1	270	19.7	82.8	0.38	111.4
62	18	10	1	291	28.1	158.1	0.51	185.7
63	23	10	1	296	17.2	77.5	0.41	73.8
64	8	11	1	312	11.4	19.5	0.15	9.5
65	2	12	1	336	9.3	21.9	0.21	14.3
68	24	12	1	358	24.6	158.1	0.58	245.1

Table B.23: Event Data for Silt Fences - Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
69	9	1	1	9	41.8	229.2	0.49	445.9
70	22	1	1	22	96.2	790.5	0.74	1164.1
71	14	2	1	45	25.5	144.5	0.51	162.2
72	24	2	1	55	36.3	185.4	0.46	157.6
73	1	3	1	60	21.8	139.9	0.58	99.2
75	7	3	1	66	20.6	96.3	0.42	77.6
76	20	3	1	79	16.6	39.5	0.21	16.3
77	18	4	1	108	30.2	215.3	0.64	186.2
78	19	4	1	109	11.8	33.2	0.25	23.4
79	25	4	1	115	56.3	387.2	0.62	326.0
80	2	5	1	122	22.7	115.0	0.46	71.8
81	4	5	1	124	8.6	22.7	0.24	15.0
82	7	5	1	127	31.1	189.3	0.55	249.6
83	19	5	1	139	81.4	664.2	0.74	674.2
84	31	5	1	151	24.7	161.2	0.59	126.4
85	20	6	1	171	9.0	11.3	0.11	4.1
86	19	7	1	200	31.0	186.7	0.54	120.1
87	30	7	1	211	27.0	147.1	0.49	100.0
88	4	8	1	216	14.5	45.8	0.28	42.6
89	22	8	1	234	27.0	155.2	0.52	103.4
90	7	9	1	250	20.5	75.1	0.33	38.5
91	21	9	1	264	36.7	224.0	0.55	233.6
92	10	10	1	283	13.3	44.4	0.30	40.6
93	12	10	1	285	19.9	86.9	0.39	62.2
94	18	10	1	291	16.0	11.6	0.07	2.4
95	3	11	1	307	13.7	44.7	0.29	39.4
96	8	11	1	312	49.2	356.5	0.65	252.1
97	2	12	1	336	49.1	331.4	0.61	276.6
100	22	12	1	356	37.5	198.2	0.48	145.8
101	28	12	1	362	31.7	180.0	0.51	122.2

Table B.24: Event Data for Silt Fences - Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
102	9	1	1	9	37.6	208.6	0.50	435.0
103	22	1	1	22	87.7	713.4	0.73	1063.5
104	29	1	1	29	20.8	111.3	0.48	102.4
108	5	4	1	95	21.1	131.5	0.56	100.8
109	13	4	1	103	37.6	237.1	0.57	401.4
110	19	4	1	109	16.9	61.7	0.33	30.2
111	2	5	1	122	26.1	152.3	0.53	246.3
112	3	5	1	123	74.5	604.9	0.73	610.3
113	5	5	1	125	20.3	113.7	0.50	72.2
114	22	5	1	142	9.0	12.8	0.13	4.3
115	13	6	1	164	28.0	157.1	0.51	100.3
116	28	6	1	179	23.9	118.9	0.45	97.1
117	14	7	1	195	11.6	27.6	0.21	21.2
118	19	7	1	200	21.9	108.9	0.45	70.1
119	4	8	1	216	16.4	38.3	0.21	17.2
120	11	8	1	223	30.4	170.2	0.50	155.8
121	22	8	1	234	9.6	18.8	0.18	11.3
122	28	8	1	240	15.1	44.5	0.27	24.7
123	7	9	1	250	37.4	238.6	0.57	167.5
124	27	9	1	270	36.6	214.4	0.53	151.3
125	10	10	1	283	63.0	464.0	0.66	1153.4
126	11	10	1	284	23.0	132.1	0.52	175.7
127	24	10	1	297	25.4	86.8	0.31	51.2
128	8	11	1	312	23.5	108.0	0.41	166.0
130	2	12	1	336	18.6	82.6	0.40	92.2
131	22	12	1	356	8.3	15.1	0.16	12.6

Table B.25: Event Data for Silt Fences - Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	50.1	0.11	155.2
2	22	1	1	22	86.6	524.8	0.55	1881.4
3	29	1	1	29	23.3	32.0	0.12	42.2
4	21	2	1	52	34.7	105.5	0.27	574.6
7	8	4	1	98	25.0	58.1	0.21	112.1
8	14	4	1	104	45.2	198.9	0.40	598.6
9	4	5	1	124	23.2	49.3	0.19	101.4
10	5	5	1	125	61.9	310.7	0.45	599.2
11	10	7	1	191	24.9	53.4	0.19	124.4
12	20	7	1	201	23.4	42.7	0.16	66.3
13	9	8	1	221	29.7	47.3	0.14	69.1
14	2	9	1	245	44.4	141.6	0.29	207.7
15	26	9	1	269	43.6	102.7	0.21	138.2
16	27	9	1	270	95.7	708.2	0.67	2381.2
18	10	10	1	283	27.8	83.1	0.27	206.3
19	19	10	1	292	30.6	110.5	0.33	373.9
20	25	10	1	298	26.1	60.4	0.21	181.3
21	12	11	1	316	36.0	112.0	0.28	199.7
22	28	12	1	362	29.4	113.9	0.35	171.2

Table B.26: Event Data for Silt Fences - Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	17.1	0.05	57.5
24	22	1	1	22	69.4	375.3	0.49	1196.4
26	5	4	1	95	36.1	139.1	0.35	444.5
27	18	4	1	108	20.8	32.9	0.14	68.6
28	19	4	1	109	57.7	271.6	0.42	499.5
29	31	5	1	151	20.9	32.6	0.14	68.2
30	29	6	1	180	20.9	23.3	0.10	29.9
31	25	7	1	206	30.5	51.4	0.15	77.7
32	18	8	1	230	30.5	30.3	0.09	38.4
33	31	8	1	243	60.0	364.5	0.55	1162.2
34	1	9	1	244	21.2	54.9	0.23	106.2
35	13	9	1	256	23.5	46.0	0.18	116.9
36	27	9	1	270	19.7	30.5	0.14	69.6
37	18	10	1	291	28.1	48.9	0.16	70.9
38	24	12	1	358	24.6	89.0	0.33	180.6

Table B.27: Event Data for Silt Fences - Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
39	9	1	1	9	41.8	61.4	0.13	274.4
40	22	1	1	22	96.2	600.8	0.56	2294.7
42	14	2	1	45	25.5	38.3	0.14	57.9
43	24	2	1	55	36.3	113.9	0.28	628.0
48	18	4	1	108	30.2	100.1	0.30	201.4
49	25	4	1	115	56.3	270.7	0.43	849.3
50	2	5	1	122	22.7	16.4	0.07	16.3
51	7	5	1	127	31.1	109.7	0.32	334.6
52	19	5	1	139	81.4	466.5	0.52	1003.6
53	31	5	1	151	24.7	28.4	0.10	27.0
54	19	7	1	200	31.0	95.7	0.28	632.3
55	30	7	1	211	27.0	63.2	0.21	152.6
56	22	8	1	234	27.0	62.5	0.21	98.7
57	21	9	1	264	36.7	99.8	0.24	149.3
58	8	11	1	312	49.2	178.3	0.33	271.1
59	2	12	1	336	49.1	143.8	0.26	201.7
63	22	12	1	356	37.5	149.4	0.36	568.2
64	28	12	1	362	31.7	99.0	0.28	268.5

Table B.28: Event Data for Silt Fences - Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
65	9	1	1	9	37.6	54.2	0.13	177.8
67	22	1	1	22	87.7	532.5	0.55	1733.2
69	29	1	1	29	20.8	17.6	0.08	17.3
70	5	4	1	95	21.1	27.3	0.12	42.6
71	13	4	1	103	37.6	148.1	0.35	511.0
72	2	5	1	122	26.1	76.2	0.26	187.0
73	3	5	1	123	74.5	431.8	0.52	879.2
75	13	6	1	164	28.0	85.0	0.27	539.4
76	28	6	1	179	23.9	48.3	0.18	111.2
77	19	7	1	200	21.9	29.8	0.12	42.8
78	11	8	1	223	30.4	51.5	0.15	79.0
79	7	9	1	250	37.4	82.7	0.20	122.4
80	27	9	1	270	36.6	50.2	0.12	60.8
81	10	10	1	283	63.0	345.7	0.49	1194.3
82	11	10	1	284	23.0	69.9	0.27	145.4
83	24	10	1	297	25.4	55.0	0.20	154.1
84	8	11	1	312	23.5	48.8	0.19	136.0

Table B.29: Event Data for Silt Fences - Silt Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	92.1	0.21	177.8
2	22	1	1	22	86.6	584.5	0.61	1107.4
3	29	1	1	29	23.3	60.7	0.23	53.1
4	21	2	1	52	34.7	111.9	0.29	258.3
8	8	4	1	98	25.0	67.3	0.24	85.2
9	14	4	1	104	45.2	210.2	0.42	394.8
10	25	4	1	115	19.8	13.6	0.06	8.4
11	4	5	1	124	23.2	50.8	0.20	71.1
12	5	5	1	125	61.9	334.5	0.49	401.2
13	10	7	1	191	24.9	67.0	0.24	87.9
14	20	7	1	201	23.4	50.3	0.19	48.9
15	9	8	1	221	29.7	64.1	0.19	53.1
16	2	9	1	245	44.4	174.0	0.35	159.3
17	26	9	1	269	43.6	136.9	0.28	115.1
18	27	9	1	270	95.7	720.8	0.68	1594.8
20	10	10	1	283	27.8	99.4	0.32	162.2
21	19	10	1	292	30.6	122.2	0.36	267.8
22	25	10	1	298	26.1	72.2	0.25	114.0
23	12	11	1	316	36.0	143.3	0.36	164.8
24	28	12	1	362	29.4	151.5	0.46	146.2
25	31	12	1	365	19.7	33.4	0.15	25.3

Table B.30: Event Data for Silt Fences - Silt Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
26	9	1	1	9	31.6	34.9	0.10	67.4
27	22	1	1	22	69.4	426.6	0.55	776.0
28	29	1	1	29	18.4	20.5	0.10	13.2
30	5	4	1	95	36.1	148.2	0.37	270.0
31	18	4	1	108	20.8	37.1	0.16	50.1
32	19	4	1	109	57.7	296.5	0.46	355.1
33	31	5	1	151	20.9	39.6	0.17	51.3
34	29	6	1	180	20.9	30.1	0.13	25.1
35	25	7	1	206	30.5	67.4	0.20	56.5
36	18	8	1	230	30.5	51.1	0.15	39.3
37	30	8	1	242	30.0	27.3	0.08	17.5
38	31	8	1	243	60.0	369.2	0.55	787.4
39	1	9	1	244	21.2	74.2	0.32	95.4
43	13	9	1	256	23.5	52.7	0.20	87.4
44	27	9	1	270	19.7	37.6	0.17	56.0
45	18	10	1	291	28.1	73.5	0.24	70.7
46	23	10	1	296	17.2	16.6	0.09	13.6
50	24	12	1	358	24.6	111.1	0.41	146.4

Table B.31: Event Data for Silt Fences - Silt Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
51	9	1	1	9	41.8	80.2	0.17	163.6
52	22	1	1	22	96.2	659.3	0.62	1288.5
53	14	2	1	45	25.5	64.0	0.23	60.4
54	24	2	1	55	36.3	119.9	0.30	231.5
55	1	3	1	60	21.8	31.3	0.13	18.2
57	7	3	1	66	20.6	20.6	0.09	15.3
58	18	4	1	108	30.2	107.5	0.32	144.8
59	25	4	1	115	56.3	283.9	0.45	563.0
60	2	5	1	122	22.7	24.5	0.10	17.8
61	7	5	1	127	31.1	117.4	0.34	234.2
62	19	5	1	139	81.4	495.4	0.55	650.3
63	31	5	1	151	24.7	45.1	0.16	29.5
64	19	7	1	200	31.0	98.2	0.29	420.5
65	30	7	1	211	27.0	69.8	0.23	107.7
68	22	8	1	234	27.0	76.9	0.26	78.2
69	21	9	1	264	36.7	127.1	0.31	124.4
70	12	10	1	285	19.9	14.6	0.07	10.4
71	8	11	1	312	49.2	223.5	0.41	216.6
72	2	12	1	336	49.1	191.1	0.35	161.9
77	22	12	1	356	37.5	164.3	0.39	403.5
78	28	12	1	362	31.7	118.9	0.34	203.9

Table B.32: Event Data for Silt Fences - Silt Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
79	9	1	1	9	37.6	72.7	0.17	133.5
80	22	1	1	22	87.7	593.7	0.61	1129.1
81	29	1	1	29	20.8	41.6	0.18	33.8
83	5	4	1	95	21.1	36.5	0.16	38.1
84	13	4	1	103	37.6	156.6	0.38	360.6
85	2	5	1	122	26.1	82.8	0.29	135.3
86	3	5	1	123	74.5	452.3	0.55	574.3
87	5	5	1	125	20.3	16.5	0.07	8.1
88	13	6	1	164	28.0	85.6	0.28	359.1
89	28	6	1	179	23.9	53.2	0.20	77.2
90	19	7	1	200	21.9	36.9	0.15	35.5
91	11	8	1	223	30.4	69.4	0.21	58.9
92	7	9	1	250	37.4	111.8	0.27	91.5
93	27	9	1	270	36.6	82.5	0.20	62.5
94	10	10	1	283	63.0	371.9	0.53	813.2
95	11	10	1	284	23.0	84.1	0.33	117.9
96	24	10	1	297	25.4	63.2	0.22	115.7
97	8	11	1	312	23.5	59.0	0.23	108.2
100	2	12	1	336	18.6	25.8	0.12	23.8

Table B.33: Event Data for Silt Fences - Silt Clay - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	177.5	0.40	261.3
2	22	1	1	22	86.6	654.6	0.68	954.1
3	29	1	1	29	23.3	101.0	0.39	73.0
4	21	2	1	52	34.7	143.0	0.37	137.7
7	8	4	1	98	25.0	123.2	0.44	78.6
8	14	4	1	104	45.2	259.7	0.52	331.5
9	25	4	1	115	19.8	55.1	0.25	22.5
10	4	5	1	124	23.2	87.2	0.34	88.6
11	5	5	1	125	61.9	425.0	0.62	387.3
12	19	5	1	139	18.4	59.3	0.29	22.6
13	20	6	1	171	25.1	89.8	0.32	27.2
14	10	7	1	191	24.9	103.4	0.37	78.0
15	17	7	1	198	11.5	16.3	0.13	8.9
16	20	7	1	201	23.4	101.7	0.39	54.6
17	5	8	1	217	16.9	19.0	0.10	6.3
18	9	8	1	221	29.7	143.2	0.43	88.1
19	24	8	1	236	15.6	34.8	0.20	11.6
20	2	9	1	245	44.4	277.6	0.56	147.4
21	26	9	1	269	43.6	251.7	0.52	129.8
22	27	9	1	270	95.7	762.9	0.72	1316.1
23	10	10	1	283	27.8	151.5	0.49	191.8
24	19	10	1	292	30.6	153.1	0.45	249.7
25	25	10	1	298	26.1	115.7	0.40	124.5
26	12	11	1	316	36.0	220.3	0.55	195.9
27	13	12	1	347	9.9	21.1	0.19	16.2
28	22	12	1	356	10.7	12.6	0.11	3.1
29	24	12	1	358	10.2	18.6	0.16	9.7
30	28	12	1	362	29.4	207.7	0.64	153.3
31	31	12	1	365	19.7	82.0	0.38	45.3
32	9	1	1	9	31.6	109.4	0.31	137.7

Table B.34: Event Data for Silt Fences - Silt Clay - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
32	9	1	1	9	31.6	109.4	0.31	137.7
33	22	1	1	22	69.4	490.1	0.64	639.5
34	29	1	1	29	18.4	59.4	0.29	31.3
38	5	4	1	95	36.1	189.0	0.47	224.9
39	13	4	1	103	14.9	15.0	0.09	5.1
40	18	4	1	108	20.8	68.7	0.30	62.4
41	19	4	1	109	57.7	383.2	0.60	335.0
42	28	4	1	118	16.3	29.1	0.16	9.2
43	19	5	1	139	24.2	75.3	0.28	22.4
44	31	5	1	151	20.9	73.2	0.32	67.2
45	15	6	1	166	11.4	14.8	0.12	7.8
46	29	6	1	180	20.9	77.6	0.33	43.8
47	25	7	1	206	30.5	149.5	0.44	92.0
48	5	8	1	217	13.6	12.9	0.09	4.2
49	18	8	1	230	30.5	145.7	0.43	71.6
50	30	8	1	242	30.0	122.5	0.37	47.8
51	31	8	1	243	60.0	428.1	0.64	674.6
52	1	9	1	244	21.2	106.8	0.45	106.5
53	13	9	1	256	23.5	73.1	0.28	92.2
54	27	9	1	270	19.7	71.8	0.33	63.6
55	18	10	1	291	28.1	142.1	0.46	107.0
56	23	10	1	296	17.2	62.3	0.33	39.4
57	2	12	1	336	9.3	19.7	0.19	7.3
60	24	12	1	358	24.6	152.3	0.56	152.3

Table B.35: Event Data for Silt Fences - Silt Clay - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
61	9	1	1	9	41.8	172.5	0.37	215.1
62	22	1	1	22	96.2	736.6	0.69	1118.5
63	14	2	1	45	25.5	107.9	0.38	83.9
64	24	2	1	55	36.3	150.6	0.37	141.6
65	1	3	1	60	21.8	93.6	0.39	41.3
67	7	3	1	66	20.6	62.8	0.27	33.1
68	18	4	1	108	30.2	160.7	0.48	125.5
69	25	4	1	115	56.3	347.8	0.56	478.8
70	2	5	1	122	22.7	75.7	0.30	33.4
71	7	5	1	127	31.1	165.1	0.48	202.3
72	19	5	1	139	81.4	608.3	0.67	604.1
73	31	5	1	151	24.7	123.7	0.45	62.0
74	19	7	1	200	31.0	150.4	0.44	75.0
75	30	7	1	211	27.0	117.6	0.39	76.9
76	4	8	1	216	14.5	33.6	0.21	22.1
77	22	8	1	234	27.0	130.7	0.44	74.6
78	7	9	1	250	20.5	50.5	0.22	18.5
79	21	9	1	264	36.7	203.4	0.50	142.4
80	10	10	1	283	13.3	35.9	0.24	21.6
81	12	10	1	285	19.9	71.4	0.32	33.2
82	3	11	1	307	13.7	36.7	0.24	20.8
83	8	11	1	312	49.2	324.3	0.59	173.3
84	2	12	1	336	49.1	310.1	0.57	171.2
87	22	12	1	356	37.5	191.5	0.46	167.6
88	28	12	1	362	31.7	165.4	0.47	99.2

Table B.36: Event Data for Silt Fences - Silt Clay - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
89	9	1	1	9	37.6	159.8	0.38	213.5
90	22	1	1	22	87.7	664.8	0.68	974.9
91	29	1	1	29	20.8	81.5	0.35	51.4
94	5	4	1	95	21.1	82.5	0.35	49.4
95	13	4	1	103	37.6	199.1	0.48	234.6
96	19	4	1	109	16.9	29.1	0.16	10.4
97	2	5	1	122	26.1	123.1	0.42	133.6
98	3	5	1	123	74.5	548.3	0.66	527.0
99	5	5	1	125	20.3	77.4	0.34	31.2
100	13	6	1	164	28.0	118.1	0.38	85.2
101	28	6	1	179	23.9	95.9	0.36	90.4
102	14	7	1	195	11.6	16.8	0.13	9.2
103	19	7	1	200	21.9	86.4	0.36	49.8
104	4	8	1	216	16.4	15.4	0.08	4.8
105	11	8	1	223	30.4	148.0	0.44	93.0
106	28	8	1	240	15.1	28.5	0.17	9.8
107	7	9	1	250	37.4	209.9	0.51	113.7
108	27	9	1	270	36.6	188.7	0.46	85.7
109	10	10	1	283	63.0	446.8	0.64	716.4
110	11	10	1	284	23.0	122.8	0.48	133.7
111	24	10	1	297	25.4	82.2	0.29	114.6
112	8	11	1	312	23.5	98.3	0.38	98.8
113	2	12	1	336	18.6	74.5	0.36	52.5
114	22	12	1	356	8.3	11.3	0.12	6.6

Table B.37: Event Data for Silt Fences - Silt Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	76.9	0.17	318.3
2	22	1	1	22	86.6	512.3	0.53	2383.7
3	29	1	1	29	23.3	22.0	0.09	28.4
4	21	2	1	52	34.7	100.1	0.26	749.0
7	8	4	1	98	25.0	34.0	0.12	84.9
8	14	4	1	104	45.2	179.1	0.36	952.7
9	4	5	1	124	23.2	33.4	0.13	104.2
10	5	5	1	125	61.9	272.5	0.40	706.4
11	10	7	1	191	24.9	43.1	0.16	149.5
12	20	7	1	201	23.4	30.9	0.12	63.3
13	9	8	1	221	29.7	30.4	0.09	60.3
14	2	9	1	245	44.4	118.6	0.24	253.5
15	26	9	1	269	43.6	80.6	0.17	149.5
16	27	9	1	270	95.7	679.4	0.64	3232.3
18	10	10	1	283	27.8	71.0	0.23	239.5
19	19	10	1	292	30.6	103.3	0.30	481.2
20	25	10	1	298	26.1	54.6	0.19	224.8
21	12	11	1	316	36.0	97.4	0.24	238.2
22	28	12	1	362	29.4	102.8	0.31	219.3

Table B.38: Event Data for Silt Fences - Silt Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	27.4	0.08	122.5
24	22	1	1	22	69.4	363.7	0.47	1610.4
25	5	4	1	95	36.1	123.0	0.31	537.4
26	18	4	1	108	20.8	20.7	0.09	54.8
27	19	4	1	109	57.7	231.8	0.36	567.6
28	31	5	1	151	20.9	22.3	0.10	60.5
29	29	6	1	180	20.9	11.9	0.05	17.4
30	25	7	1	206	30.5	34.1	0.10	72.8
31	18	8	1	230	30.5	13.9	0.04	19.5
32	31	8	1	243	60.0	337.7	0.51	1548.8
33	1	9	1	244	21.2	50.9	0.22	134.1
34	13	9	1	256	23.5	39.4	0.15	136.3
35	27	9	1	270	19.7	24.0	0.11	71.3
36	18	10	1	291	28.1	35.4	0.11	70.9
37	24	12	1	358	24.6	80.3	0.29	222.9

Table B.39: Event Data for Silt Fences - Silt Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
38	9	1	1	9	41.8	72.5	0.16	384.8
39	22	1	1	22	96.2	583.6	0.55	2868.1
40	14	2	1	45	25.5	20.7	0.07	39.0
41	24	2	1	55	36.3	107.8	0.27	825.8
44	18	4	1	108	30.2	70.1	0.21	192.5
45	25	4	1	115	56.3	246.4	0.39	1138.4
46	7	5	1	127	31.1	94.3	0.27	363.8
47	19	5	1	139	81.4	423.5	0.47	1229.9
48	31	5	1	151	24.7	12.3	0.04	12.5
49	19	7	1	200	31.0	86.3	0.25	780.3
50	30	7	1	211	27.0	52.9	0.18	195.6
51	22	8	1	234	27.0	48.2	0.16	104.3
52	21	9	1	264	36.7	81.4	0.20	175.6
53	8	11	1	312	49.2	159.3	0.29	336.8
54	2	12	1	336	49.1	125.2	0.23	239.1
58	22	12	1	356	37.5	143.1	0.34	747.8
59	28	12	1	362	31.7	91.9	0.26	354.3

Table B.40: Event Data for Silt Fences - Silt Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
60	9	1	1	9	37.6	63.4	0.15	247.8
61	22	1	1	22	87.7	519.7	0.53	2445.2
65	13	4	1	103	37.6	135.4	0.32	603.5
66	2	5	1	122	26.1	60.3	0.21	201.4
67	3	5	1	123	74.5	387.1	0.47	1074.7
68	13	6	1	164	28.0	73.3	0.24	646.9
69	28	6	1	179	23.9	37.6	0.14	122.9
70	19	7	1	200	21.9	20.5	0.08	37.0
71	11	8	1	223	30.4	35.0	0.10	70.8
72	7	9	1	250	37.4	62.8	0.15	124.4
73	27	9	1	270	36.6	34.1	0.08	56.6
74	10	10	1	283	63.0	330.1	0.47	1592.7
75	11	10	1	284	23.0	59.6	0.23	168.9
76	24	10	1	297	25.4	49.7	0.18	192.8
77	8	11	1	312	23.5	43.4	0.17	163.3

Table B.41: Event Data for Straw-Filled Tubes - Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	227.44	0.51	533.6
2	22	1	1	22	86.6	703.82	0.73	1068.6
3	29	1	1	29	23.3	135.67	0.52	142.5
4	21	2	1	52	34.7	176.08	0.46	243.3
7	12	3	1	71	15.0	24.82	0.15	10.3
8	8	4	1	98	25.0	172.75	0.62	163.3
9	13	4	1	103	10.1	21.62	0.19	14.7
10	14	4	1	104	45.2	294.69	0.59	317.5
11	25	4	1	115	19.8	87.56	0.40	51.4
12	4	5	1	124	23.2	113.52	0.44	119.8
13	5	5	1	125	61.9	478.25	0.70	469.3
14	19	5	1	139	18.4	93.26	0.46	57.4
15	31	5	1	151	8.9	11.81	0.12	5.3
16	20	6	1	171	25.1	129.90	0.47	64.1
17	10	7	1	191	24.9	127.66	0.46	98.6
18	17	7	1	198	11.5	26.85	0.21	23.4
19	20	7	1	201	23.4	129.70	0.50	79.9
20	5	8	1	217	16.9	42.08	0.22	20.6
21	9	8	1	221	29.7	165.68	0.50	153.3
22	18	8	1	230	10.2	18.66	0.16	16.0
23	24	8	1	236	15.6	49.82	0.29	29.8
24	1	9	1	244	9.8	18.79	0.17	12.9
25	2	9	1	245	44.4	311.69	0.63	220.6
26	26	9	1	269	43.6	278.99	0.58	223.2
27	27	9	1	270	95.7	780.73	0.73	2114.9
28	10	10	1	283	27.8	164.80	0.53	221.7
29	19	10	1	292	30.6	161.73	0.48	156.1
30	25	10	1	298	26.1	127.45	0.44	139.1
31	12	11	1	316	36.0	236.15	0.59	334.2
32	13	12	1	347	9.9	26.88	0.24	31.3
33	22	12	1	356	10.7	21.39	0.18	9.4
34	24	12	1	358	10.2	21.88	0.19	20.0
35	28	12	1	362	29.4	215.76	0.66	252.6
36	31	12	1	365	19.7	88.77	0.41	79.8

Table B.42: Event Data for Straw-Filled Tubes - Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
37	9	1	1	9	31.6	160.98	0.46	327.8
38	22	1	1	22	69.4	533.47	0.69	673.6
39	29	1	1	29	18.4	88.80	0.43	75.7
43	5	4	1	95	36.1	223.56	0.56	400.2
44	13	4	1	103	14.9	43.39	0.26	20.5
45	18	4	1	108	20.8	94.26	0.41	135.9
46	19	4	1	109	57.7	437.84	0.68	423.8
47	28	4	1	118	16.3	69.65	0.38	36.5
48	19	5	1	139	24.2	124.22	0.46	58.0
49	31	5	1	151	20.9	94.22	0.41	80.7
50	15	6	1	166	11.4	26.71	0.21	23.1
51	29	6	1	180	20.9	100.02	0.43	73.4
52	20	7	1	201	15.0	27.77	0.17	13.0
53	25	7	1	206	30.5	172.16	0.51	161.2
54	3	8	1	215	8.7	12.21	0.13	8.0
55	5	8	1	217	13.6	31.99	0.21	17.7
56	18	8	1	230	30.5	178.54	0.53	113.6
57	30	8	1	242	30.0	154.22	0.46	92.2
58	31	8	1	243	60.0	444.96	0.67	1098.6
59	1	9	1	244	21.2	116.53	0.50	187.8
60	13	9	1	256	23.5	77.68	0.30	106.9
61	27	9	1	270	19.7	83.06	0.38	118.8
62	18	10	1	291	28.1	158.23	0.51	191.8
63	23	10	1	296	17.2	77.52	0.41	78.3
64	8	11	1	312	11.4	19.48	0.15	11.5
65	2	12	1	336	9.3	22.02	0.21	16.6
68	24	12	1	358	24.6	158.32	0.58	253.2

Table B.43: Event Data for Straw-Filled Tubes - Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
69	9	1	1	9	41.8	229.42	0.49	455.5
70	22	1	1	22	96.2	790.60	0.74	1171.0
71	14	2	1	45	25.5	144.54	0.51	168.3
72	24	2	1	55	36.3	185.72	0.46	162.0
73	1	3	1	60	21.8	139.86	0.58	102.4
75	7	3	1	66	20.6	96.30	0.42	81.3
76	20	3	1	79	16.6	39.41	0.21	17.6
77	18	4	1	108	30.2	215.54	0.64	190.5
78	19	4	1	109	11.8	33.15	0.25	26.1
79	25	4	1	115	56.3	387.19	0.62	329.1
80	2	5	1	122	22.7	115.11	0.46	74.9
81	4	5	1	124	8.6	22.66	0.24	17.2
82	7	5	1	127	31.1	189.56	0.55	256.2
83	19	5	1	139	81.4	664.49	0.74	680.1
84	31	5	1	151	24.7	161.27	0.59	130.3
85	20	6	1	171	9.0	11.26	0.11	5.7
86	19	7	1	200	31.0	186.90	0.54	123.3
87	30	7	1	211	27.0	147.27	0.49	103.5
88	4	8	1	216	14.5	45.96	0.29	47.4
89	22	8	1	234	27.0	155.37	0.52	107.0
90	7	9	1	250	20.5	75.05	0.33	40.8
91	21	9	1	264	36.7	224.17	0.55	239.2
92	10	10	1	283	13.3	44.48	0.30	45.3
93	12	10	1	285	19.9	87.00	0.39	65.9
94	18	10	1	291	16.0	11.65	0.07	3.2
95	3	11	1	307	13.7	44.84	0.29	42.9
96	8	11	1	312	49.2	356.67	0.65	255.8
97	2	12	1	336	49.1	331.55	0.61	281.1
100	22	12	1	356	37.5	198.48	0.48	149.5
101	28	12	1	362	31.7	180.19	0.51	125.7

Table B.44: Event Data for Straw-Filled Tubes - Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
102	9	1	1	9	37.6	208.86	0.50	445.4
103	22	1	1	22	87.7	713.63	0.73	1071.1
104	29	1	1	29	20.8	111.51	0.48	107.3
108	5	4	1	95	21.1	131.54	0.56	104.9
109	13	4	1	103	37.6	237.35	0.57	409.8
110	19	4	1	109	16.9	61.72	0.33	32.4
111	2	5	1	122	26.1	152.48	0.53	254.7
112	3	5	1	123	74.5	604.92	0.73	615.3
113	5	5	1	125	20.3	113.81	0.51	75.3
114	22	5	1	142	9.0	12.74	0.13	5.8
115	13	6	1	164	28.0	157.34	0.51	103.7
116	28	6	1	179	23.9	119.13	0.45	101.4
117	14	7	1	195	11.6	27.59	0.21	24.2
118	19	7	1	200	21.9	108.79	0.45	72.9
119	4	8	1	216	16.4	38.28	0.21	18.4
120	11	8	1	223	30.4	170.46	0.51	160.6
121	22	8	1	234	9.6	18.80	0.18	13.5
122	28	8	1	240	15.1	44.53	0.27	26.9
123	7	9	1	250	37.4	238.78	0.58	171.3
124	27	9	1	270	36.6	214.67	0.53	155.0
125	10	10	1	283	63.0	464.32	0.66	1164.9
126	11	10	1	284	23.0	132.07	0.52	181.9
127	24	10	1	297	25.4	86.76	0.31	53.9
128	8	11	1	312	23.5	108.25	0.41	174.4
130	2	12	1	336	18.6	82.80	0.40	98.3
131	22	12	1	356	8.3	15.07	0.16	16.1

Table B.45: Event Data for Straw-Filled Tubes - Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	50.09	0.11	166.2
2	22	1	1	22	86.6	524.76	0.55	1894.2
3	29	1	1	29	23.3	31.92	0.12	46.1
4	21	2	1	52	34.7	105.68	0.27	603.2
7	8	4	1	98	25.0	58.14	0.21	120.3
8	14	4	1	104	45.2	199.10	0.40	613.0
9	4	5	1	124	23.2	49.49	0.19	107.4
10	5	5	1	125	61.9	310.73	0.45	607.6
11	10	7	1	191	24.9	53.50	0.19	134.4
12	20	7	1	201	23.4	42.83	0.16	69.4
13	9	8	1	221	29.7	47.24	0.14	74.2
14	2	9	1	245	44.4	141.66	0.29	214.2
15	26	9	1	269	43.6	102.88	0.21	142.8
16	27	9	1	270	95.7	708.13	0.67	2397.7
18	10	10	1	283	27.8	83.33	0.27	219.1
19	19	10	1	292	30.6	110.75	0.33	391.1
20	25	10	1	298	26.1	60.64	0.21	196.1
21	12	11	1	316	36.0	111.89	0.28	207.3
22	28	12	1	362	29.4	114.15	0.35	178.9

Table B.46: Event Data for Straw-Filled Tubes - Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	17.26	0.05	66.4
24	22	1	1	22	69.4	375.57	0.49	1211.2
26	5	4	1	95	36.1	139.17	0.35	459.4
27	18	4	1	108	20.8	32.85	0.14	74.3
28	19	4	1	109	57.7	271.56	0.42	507.8
29	31	5	1	151	20.9	32.61	0.14	74.6
30	29	6	1	180	20.9	23.31	0.10	33.9
31	25	7	1	206	30.5	51.42	0.15	83.9
32	18	8	1	230	30.5	30.24	0.09	40.7
33	31	8	1	243	60.0	364.74	0.55	1177.0
34	1	9	1	244	21.2	54.92	0.23	114.1
35	13	9	1	256	23.5	46.15	0.18	127.8
36	27	9	1	270	19.7	30.53	0.14	76.8
37	18	10	1	291	28.1	49.02	0.16	77.3
38	24	12	1	358	24.6	88.93	0.33	189.4

Table B.47: Event Data for Straw-Filled Tubes - Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
39	9	1	1	9	41.8	61.50	0.13	295.3
40	22	1	1	22	96.2	601.03	0.56	2310.8
42	14	2	1	45	25.5	38.32	0.14	62.6
43	24	2	1	55	36.3	114.12	0.28	656.5
48	18	4	1	108	30.2	100.28	0.30	211.0
49	25	4	1	115	56.3	270.66	0.43	860.8
50	2	5	1	122	22.7	16.37	0.06	19.5
51	7	5	1	127	31.1	109.87	0.32	350.3
52	19	5	1	139	81.4	466.74	0.52	1014.8
53	31	5	1	151	24.7	28.34	0.10	28.8
54	19	7	1	200	31.0	95.75	0.28	667.8
55	30	7	1	211	27.0	63.21	0.21	163.1
56	22	8	1	234	27.0	62.49	0.21	105.3
57	21	9	1	264	36.7	99.86	0.25	156.6
58	8	11	1	312	49.2	178.50	0.33	278.6
59	2	12	1	336	49.1	143.87	0.26	208.4
63	22	12	1	356	37.5	149.60	0.36	587.0
64	28	12	1	362	31.7	99.23	0.28	282.7

Table B.48: Event Data for Straw-Filled Tubes - Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
65	9	1	1	9	37.6	54.33	0.13	192.3
67	22	1	1	22	87.7	532.54	0.55	1745.1
69	29	1	1	29	20.8	17.53	0.08	20.3
70	5	4	1	95	21.1	27.22	0.12	47.2
71	13	4	1	103	37.6	148.37	0.36	528.1
72	2	5	1	122	26.1	76.38	0.26	199.5
73	3	5	1	123	74.5	431.78	0.52	888.6
75	13	6	1	164	28.0	85.19	0.27	573.3
76	28	6	1	179	23.9	48.38	0.18	117.9
77	19	7	1	200	21.9	29.77	0.12	46.9
78	11	8	1	223	30.4	51.49	0.15	85.1
79	7	9	1	250	37.4	82.76	0.20	129.6
80	27	9	1	270	36.6	50.14	0.12	65.5
81	10	10	1	283	63.0	345.67	0.49	1207.2
82	11	10	1	284	23.0	70.01	0.27	154.1
83	24	10	1	297	25.4	55.12	0.20	166.6
84	8	11	1	312	23.5	48.83	0.19	148.0

Table B.49: Event Data for Straw-Filled Tubes - Silt Clay Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	92.08	0.21	184.0
2	22	1	1	22	86.6	584.77	0.61	1113.0
3	29	1	1	29	23.3	60.80	0.24	56.2
4	21	2	1	52	34.7	112.08	0.29	267.2
8	8	4	1	98	25.0	67.17	0.24	89.3
9	14	4	1	104	45.2	210.45	0.42	401.1
10	25	4	1	115	19.8	13.54	0.06	9.5
11	4	5	1	124	23.2	50.93	0.20	75.8
12	5	5	1	125	61.9	334.50	0.49	405.2
13	10	7	1	191	24.9	67.07	0.24	92.6
14	20	7	1	201	23.4	50.42	0.19	52.3
15	9	8	1	221	29.7	64.19	0.19	55.5
16	2	9	1	245	44.4	173.90	0.35	162.0
17	26	9	1	269	43.6	137.01	0.28	118.0
18	27	9	1	270	95.7	720.74	0.68	1604.4
20	10	10	1	283	27.8	99.69	0.32	168.7
21	19	10	1	292	30.6	122.43	0.36	276.1
22	25	10	1	298	26.1	72.47	0.25	120.5
23	12	11	1	316	36.0	143.55	0.36	169.1
24	28	12	1	362	29.4	151.68	0.46	149.7
25	31	12	1	365	19.7	33.37	0.15	26.9

Table B.50: Event Data for Straw-Filled Tubes - Silt Clay Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
26	9	1	1	9	31.6	35.05	0.10	73.3
27	22	1	1	22	69.4	426.54	0.55	779.8
28	29	1	1	29	18.4	20.48	0.10	14.2
30	5	4	1	95	36.1	148.35	0.37	277.3
31	18	4	1	108	20.8	37.14	0.16	53.5
32	19	4	1	109	57.7	296.54	0.46	358.9
33	31	5	1	151	20.9	39.55	0.17	54.1
34	29	6	1	180	20.9	30.10	0.13	26.8
35	25	7	1	206	30.5	67.47	0.20	59.3
36	18	8	1	230	30.5	51.12	0.15	41.4
37	30	8	1	242	30.0	27.23	0.08	18.3
38	31	8	1	243	60.0	369.18	0.55	794.6
39	1	9	1	244	21.2	74.31	0.32	100.1
43	13	9	1	256	23.5	52.78	0.20	93.5
44	27	9	1	270	19.7	37.65	0.17	60.6
45	18	10	1	291	28.1	73.49	0.24	73.9
46	23	10	1	296	17.2	16.55	0.09	15.3
50	24	12	1	358	24.6	111.27	0.41	151.4

Table B.51: Event Data for Straw-Filled Tubes - Silt Clay Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
51	9	1	1	9	41.8	80.42	0.17	171.5
52	22	1	1	22	96.2	659.49	0.62	1293.2
53	14	2	1	45	25.5	64.07	0.23	63.8
54	24	2	1	55	36.3	120.08	0.30	238.8
55	1	3	1	60	21.8	31.22	0.13	18.8
57	7	3	1	66	20.6	16.50	0.07	16.5
58	18	4	1	108	30.2	150.00	0.45	150.0
59	25	4	1	115	56.3	567.30	0.91	567.3
60	2	5	1	122	22.7	18.90	0.08	18.9
61	7	5	1	127	31.1	241.80	0.70	241.8
62	19	5	1	139	81.4	655.90	0.73	655.9
63	31	5	1	151	24.7	30.00	0.11	30.0
64	19	7	1	200	31.0	437.50	1.27	437.5
65	30	7	1	211	27.0	112.70	0.38	112.7
68	22	8	1	234	27.0	81.40	0.27	81.4
69	21	9	1	264	36.7	127.30	0.31	127.3
70	12	10	1	285	19.9	11.50	0.05	11.5
71	8	11	1	312	49.2	220.40	0.40	220.4
72	2	12	1	336	49.1	164.40	0.30	164.4
77	22	12	1	356	37.5	164.51	0.40	412.1
78	28	12	1	362	31.7	119.10	0.34	210.4

Table B.52: Event Data for Straw-Filled Tubes - Silt Clay Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
79	9	1	1	9	37.6	72.60	0.17	139.4
80	22	1	1	22	87.7	593.63	0.61	1133.6
81	29	1	1	29	20.8	41.62	0.18	35.7
83	5	4	1	95	21.1	36.63	0.16	40.5
84	13	4	1	103	37.6	156.79	0.38	368.8
85	2	5	1	122	26.1	83.04	0.29	141.8
86	3	5	1	123	74.5	452.24	0.55	579.2
87	5	5	1	125	20.3	16.56	0.07	8.7
88	13	6	1	164	28.0	85.76	0.28	376.0
89	28	6	1	179	23.9	53.27	0.20	82.2
90	19	7	1	200	21.9	36.95	0.15	37.8
91	11	8	1	223	30.4	69.54	0.21	61.5
92	7	9	1	250	37.4	111.85	0.27	94.0
93	27	9	1	270	36.6	82.55	0.20	64.9
94	10	10	1	283	63.0	371.92	0.53	817.4
95	11	10	1	284	23.0	84.25	0.33	123.3
96	24	10	1	297	25.4	63.28	0.22	122.3
97	8	11	1	312	23.5	58.95	0.23	114.2
100	2	12	1	336	18.6	25.77	0.12	25.9

Table B.53: Event Data for Straw-Filled Tubes - Silt Clay - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	177.62	0.40	267.8
2	22	1	1	22	86.6	654.74	0.68	958.0
3	29	1	1	29	23.3	101.17	0.39	76.0
4	21	2	1	52	34.7	143.23	0.37	141.6
7	8	4	1	98	25.0	123.37	0.44	81.8
8	14	4	1	104	45.2	260.03	0.52	335.7
9	25	4	1	115	19.8	55.15	0.25	24.0
10	4	5	1	124	23.2	87.17	0.34	92.2
11	5	5	1	125	61.9	424.94	0.62	391.0
12	19	5	1	139	18.4	59.30	0.29	23.9
13	20	6	1	171	25.1	89.75	0.32	28.2
14	10	7	1	191	24.9	103.27	0.37	80.6
15	17	7	1	198	11.5	16.32	0.13	10.0
16	20	7	1	201	23.4	101.63	0.39	56.4
17	5	8	1	217	16.9	18.94	0.10	6.8
18	9	8	1	221	29.7	143.43	0.44	90.6
19	24	8	1	236	15.6	34.85	0.20	12.1
20	2	9	1	245	44.4	277.75	0.56	149.9
21	26	9	1	269	43.6	251.87	0.52	132.0
22	27	9	1	270	95.7	762.88	0.72	1325.1
23	10	10	1	283	27.8	151.66	0.49	196.8
24	19	10	1	292	30.6	153.29	0.45	256.7
25	25	10	1	298	26.1	115.88	0.40	129.1
26	12	11	1	316	36.0	220.48	0.55	199.4
27	13	12	1	347	9.9	21.24	0.19	17.9
28	22	12	1	356	10.7	12.54	0.11	3.6
29	24	12	1	358	10.2	18.71	0.17	11.0
30	28	12	1	362	29.4	207.95	0.64	156.0
31	31	12	1	365	19.7	82.04	0.38	47.3

Table B.54: Event Data for Straw-Filled Tubes - Silt Clay - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
32	9	1	1	9	31.6	109.56	0.31	143.2
33	22	1	1	22	69.4	490.04	0.64	642.4
34	29	1	1	29	18.4	59.50	0.29	33.4
38	5	4	1	95	36.1	189.21	0.47	229.2
39	13	4	1	103	14.9	14.98	0.09	5.7
40	18	4	1	108	20.8	68.79	0.30	66.0
41	19	4	1	109	57.7	383.14	0.60	338.5
42	28	4	1	118	16.3	29.17	0.16	9.4
43	19	5	1	139	24.2	75.40	0.28	23.1
44	31	5	1	151	20.9	73.27	0.32	70.9
45	15	6	1	166	11.4	14.76	0.12	9.0
46	29	6	1	180	20.9	77.59	0.33	45.8
47	25	7	1	206	30.5	149.75	0.44	94.5
48	5	8	1	217	13.6	12.86	0.09	4.8
49	18	8	1	230	30.5	145.69	0.43	73.3
50	30	8	1	242	30.0	122.64	0.37	49.3
51	31	8	1	243	60.0	428.10	0.64	680.1
52	1	9	1	244	21.2	106.73	0.45	110.2
53	13	9	1	256	23.5	73.33	0.28	97.7
54	27	9	1	270	19.7	72.01	0.33	67.6
55	18	10	1	291	28.1	142.34	0.46	110.2
56	23	10	1	296	17.2	62.39	0.33	42.0
57	2	12	1	336	9.3	19.64	0.19	8.0
60	24	12	1	358	24.6	152.46	0.56	156.4

Table B.55: Event Data for Straw-Filled Tubes - Silt Clay - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
61	9	1	1	9	41.8	172.73	0.37	219.8
62	22	1	1	22	96.2	736.75	0.69	1122.7
63	14	2	1	45	25.5	108.17	0.38	87.2
64	24	2	1	55	36.3	150.83	0.37	145.3
65	1	3	1	60	21.8	93.64	0.39	42.9
67	7	3	1	66	20.6	62.93	0.28	35.2
68	18	4	1	108	30.2	160.86	0.48	128.7
69	25	4	1	115	56.3	347.85	0.56	481.8
70	2	5	1	122	22.7	75.81	0.30	35.1
71	7	5	1	127	31.1	165.33	0.48	207.0
72	19	5	1	139	81.4	608.57	0.67	608.7
73	31	5	1	151	24.7	123.83	0.45	63.9
74	19	7	1	200	31.0	150.65	0.44	76.9
75	30	7	1	211	27.0	117.83	0.39	79.7
76	4	8	1	216	14.5	33.74	0.21	23.7
77	22	8	1	234	27.0	130.95	0.44	77.1
78	7	9	1	250	20.5	50.56	0.22	19.4
79	21	9	1	264	36.7	203.66	0.50	145.3
80	10	10	1	283	13.3	35.91	0.24	23.5
81	12	10	1	285	19.9	71.49	0.32	35.0
82	3	11	1	307	13.7	36.75	0.24	22.6
83	8	11	1	312	49.2	324.55	0.59	175.3
84	2	12	1	336	49.1	310.29	0.57	173.8
87	22	12	1	356	37.5	191.75	0.46	170.8
88	28	12	1	362	31.7	165.58	0.47	101.5

Table B.56: Event Data for Straw-Filled Tubes - Silt Clay - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
89	9	1	1	9	37.6	159.98	0.38	218.6
90	22	1	1	22	87.7	665.06	0.68	980.1
91	29	1	1	29	20.8	81.49	0.35	53.7
94	5	4	1	95	21.1	82.75	0.35	52.0
95	13	4	1	103	37.6	199.32	0.48	238.8
96	19	4	1	109	16.9	29.23	0.16	11.0
97	2	5	1	122	26.1	123.28	0.43	138.2
98	3	5	1	123	74.5	548.29	0.66	531.7
99	5	5	1	125	20.3	77.37	0.34	32.5
100	13	6	1	164	28.0	118.30	0.38	88.2
101	28	6	1	179	23.9	95.85	0.36	93.6
102	14	7	1	195	11.6	16.92	0.13	10.5
103	19	7	1	200	21.9	86.41	0.36	51.8
104	4	8	1	216	16.4	15.34	0.08	5.2
105	11	8	1	223	30.4	148.24	0.44	95.6
106	28	8	1	240	15.1	28.43	0.17	10.5
107	7	9	1	250	37.4	210.11	0.51	116.0
108	27	9	1	270	36.6	188.91	0.46	87.5
109	10	10	1	283	63.0	446.81	0.64	719.4
110	11	10	1	284	23.0	122.72	0.48	137.7
111	24	10	1	297	25.4	82.14	0.29	119.5
112	8	11	1	312	23.5	98.44	0.38	103.3
113	2	12	1	336	18.6	74.55	0.36	55.1
114	22	12	1	356	8.3	11.30	0.12	7.8

Table B.57: Event Data for Straw-Filled Tubes - Silt Loam - Chattanooga

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
1	9	1	1	9	39.9	76.98	0.17	338.2
2	22	1	1	22	86.6	512.22	0.53	2401.1
3	29	1	1	29	23.3	22.04	0.09	33.2
4	21	2	1	52	34.7	100.36	0.26	787.8
7	8	4	1	98	25.0	33.95	0.12	94.3
8	14	4	1	104	45.2	179.30	0.36	978.5
9	4	5	1	124	23.2	33.34	0.13	115.4
10	5	5	1	125	61.9	272.51	0.40	717.4
11	10	7	1	191	24.9	43.13	0.16	163.1
12	20	7	1	201	23.4	30.88	0.12	70.9
13	9	8	1	221	29.7	30.50	0.09	67.6
14	2	9	1	245	44.4	118.69	0.24	263.8
15	26	9	1	269	43.6	80.56	0.17	157.6
16	27	9	1	270	95.7	679.39	0.64	3253.9
18	10	10	1	283	27.8	70.91	0.23	254.3
19	19	10	1	292	30.6	103.19	0.30	500.9
20	25	10	1	298	26.1	54.56	0.19	242.5
21	12	11	1	316	36.0	97.39	0.24	249.0
22	28	12	1	362	29.4	103.00	0.32	230.4

Table B.58: Event Data for Straw-Filled Tubes - Silt Loam - Knoxville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
23	9	1	1	9	31.6	27.40	0.08	140.7
24	22	1	1	22	69.4	363.98	0.47	1631.4
25	5	4	1	95	36.1	123.21	0.31	559.5
26	18	4	1	108	20.8	20.74	0.09	64.3
27	19	4	1	109	57.7	231.83	0.36	578.4
28	31	5	1	151	20.9	22.32	0.10	70.0
29	29	6	1	180	20.9	11.82	0.05	24.1
30	25	7	1	206	30.5	34.10	0.10	80.3
31	18	8	1	230	30.5	13.93	0.04	24.8
32	31	8	1	243	60.0	337.98	0.51	1570.5
33	1	9	1	244	21.2	50.89	0.22	144.4
34	13	9	1	256	23.5	39.52	0.15	150.4
35	27	9	1	270	19.7	23.94	0.11	82.7
36	18	10	1	291	28.1	35.39	0.11	78.2
37	24	12	1	358	24.6	80.34	0.29	235.3

Table B.59: Event Data for Straw-Filled Tubes - Silt Loam - Memphis

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
38	9	1	1	9	41.8	72.39	0.16	408.1
39	22	1	1	22	96.2	583.43	0.55	2888.0
40	14	2	1	45	25.5	20.85	0.07	45.8
41	24	2	1	55	36.3	108.05	0.27	865.2
44	18	4	1	108	30.2	70.23	0.21	205.2
45	25	4	1	115	56.3	246.42	0.39	1156.1
46	7	5	1	127	31.1	94.47	0.27	383.9
47	19	5	1	139	81.4	423.72	0.47	1244.2
48	31	5	1	151	24.7	12.30	0.04	16.8
49	19	7	1	200	31.0	86.56	0.25	828.1
50	30	7	1	211	27.0	52.97	0.18	213.1
51	22	8	1	234	27.0	48.31	0.16	114.5
52	21	9	1	264	36.7	81.48	0.20	185.7
53	8	11	1	312	49.2	159.26	0.29	345.7
54	2	12	1	336	49.1	125.30	0.23	248.3
58	22	12	1	356	37.5	143.35	0.34	773.8
59	28	12	1	362	31.7	92.18	0.26	374.5

Table B.60: Event Data for Straw-Filled Tubes - Silt Loam - Nashville

Event	Day	Month	Year	Julian Day	Precipitation (mm)	Runoff (m ³)	Runoff Coefficient	Sediment Yield (kg)
60	9	1	1	9	37.6	63.42	0.15	264.9
61	22	1	1	22	87.7	519.73	0.53	2463.2
65	13	4	1	103	37.6	135.68	0.33	625.5
66	2	5	1	122	26.1	60.31	0.21	215.6
67	3	5	1	123	74.5	387.10	0.47	1086.8
68	13	6	1	164	28.0	73.52	0.24	693.7
69	28	6	1	179	23.9	37.58	0.14	134.9
70	19	7	1	200	21.9	20.58	0.08	43.8
71	11	8	1	223	30.4	35.01	0.10	78.0
72	7	9	1	250	37.4	62.92	0.15	132.3
73	27	9	1	270	36.6	34.17	0.08	62.5
74	10	10	1	283	63.0	330.09	0.47	1611.4
75	11	10	1	284	23.0	59.61	0.23	180.9
76	24	10	1	297	25.4	49.82	0.18	206.9
77	8	11	1	312	23.5	43.47	0.17	181.0

C Empirical Relationships

In this section, the empirical relationships are presented for each combination of impoundment (no impoundments and silt fences), climate region, and soil type.

$$\text{Chattanooga:} \quad E = 7.756e^{7.3597 \cdot RC} \quad (r^2 = 0.6853) \quad (\text{C.1})$$

$$\text{Knoxville:} \quad E = 8.1394e^{7.5207 \cdot RC} \quad (r^2 = 0.7365) \quad (\text{C.2})$$

$$\text{Memphis:} \quad E = 8.0506e^{7.0621 \cdot RC} \quad (r^2 = 0.7645) \quad (\text{C.3})$$

$$\text{Nashville:} \quad E = 7.9402e^{7.4447 \cdot RC} \quad (r^2 = 0.7222) \quad (\text{C.4})$$

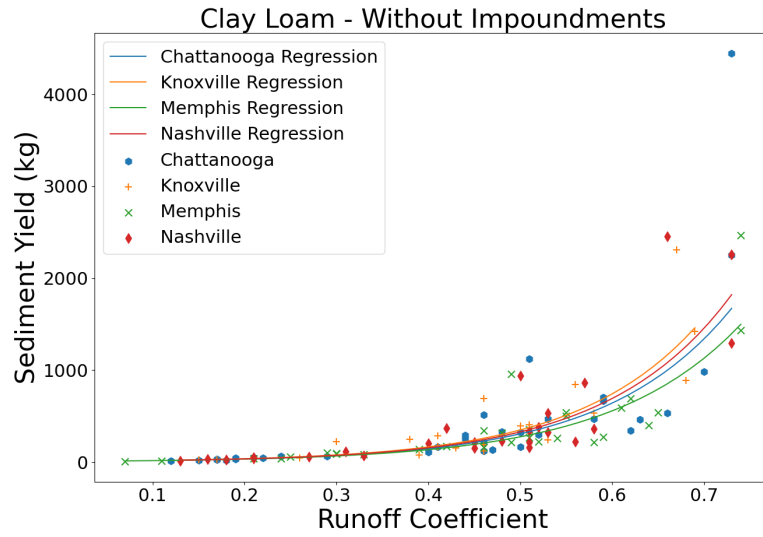


Figure C.1: Regressions by Climate - Without Impoundments - Clay Loam

$$\text{Chattanooga:} \quad E = 89.778e^{6.6339 \cdot RC} \quad (r^2 = 0.8969) \quad (\text{C.5})$$

$$\text{Knoxville:} \quad E = 67.436e^{7.1515 \cdot RC} \quad (r^2 = 0.9216) \quad (\text{C.6})$$

$$\text{Memphis:} \quad E = 64.456e^{8.0299 \cdot RC} \quad (r^2 = 0.8972) \quad (\text{C.7})$$

$$\text{Nashville:} \quad E = 68.973e^{7.6558 \cdot RC} \quad (r^2 = 0.8971) \quad (\text{C.8})$$

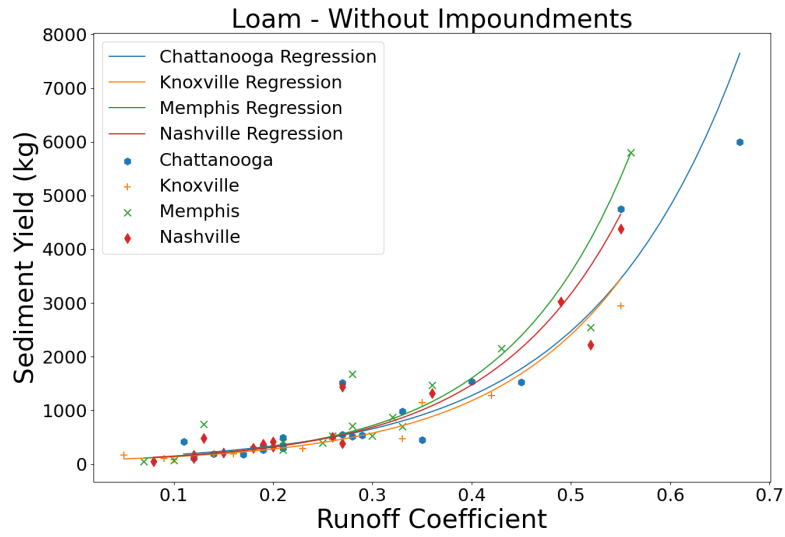


Figure C.2: Regressions by Climate - Without Impoundments - Loam

$$\text{Chattanooga:} \quad E = 9.1056e^{7.9897 \cdot RC} \quad (r^2 = 0.8377) \quad (\text{C.9})$$

$$\text{Knoxville:} \quad E = 9.6826e^{8.0377 \cdot RC} \quad (r^2 = 0.9124) \quad (\text{C.10})$$

$$\text{Memphis:} \quad E = 12.404e^{7.2952 \cdot RC} \quad (r^2 = 0.8156) \quad (\text{C.11})$$

$$\text{Nashville:} \quad E = 9.8289e^{8.1001 \cdot RC} \quad (r^2 = 0.9119) \quad (\text{C.12})$$

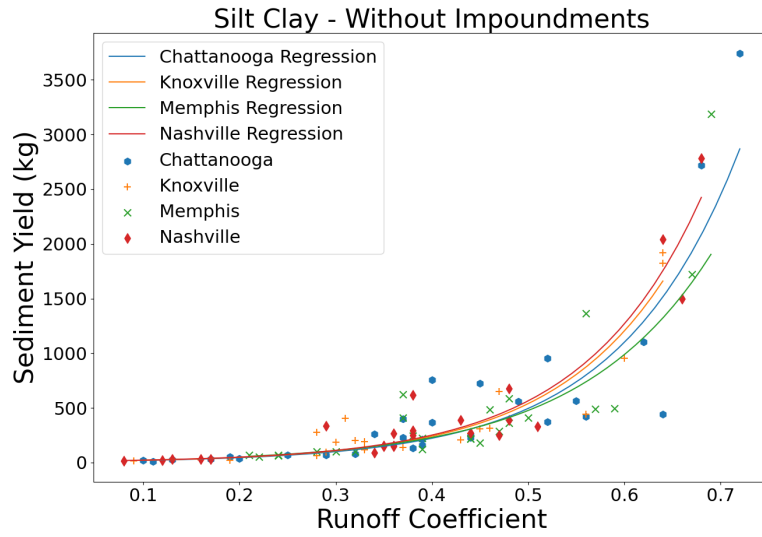


Figure C.3: Regressions by Climate - Without Impoundments - Silt Clay

$$\text{Chattanooga:} \quad E = 43.59e^{7.0569 \cdot RC} \quad (r^2 = 0.9582) \quad (\text{C.13})$$

$$\text{Knoxville:} \quad E = 38.878e^{7.2362 \cdot RC} \quad (r^2 = 0.9739) \quad (\text{C.14})$$

$$\text{Memphis:} \quad E = 33.058e^{8.2686 \cdot RC} \quad (r^2 = 0.8887) \quad (\text{C.15})$$

$$\text{Nashville:} \quad E = 40.783e^{7.6611 \cdot RC} \quad (r^2 = 0.9108) \quad (\text{C.16})$$

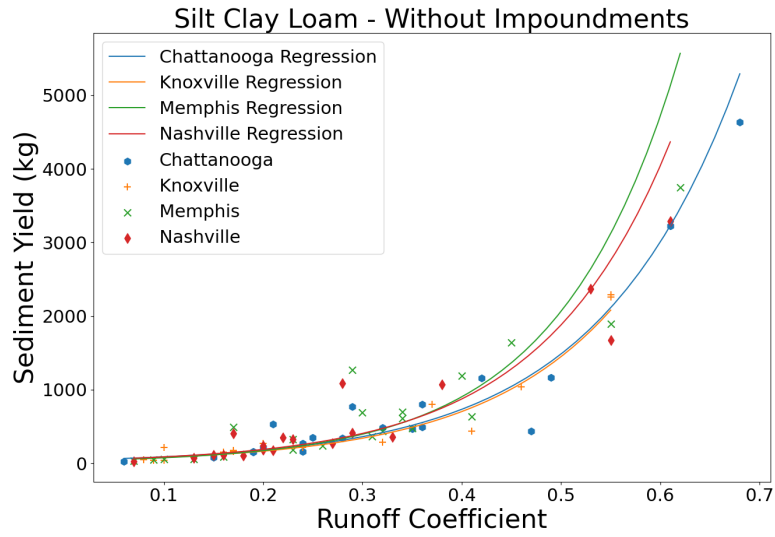


Figure C.4: Regressions by Climate - Without Impoundments - Silt Clay Loam

$$\text{Chattanooga:} \quad E = 79.039e^{7.4452 \cdot RC} \quad (r^2 = 0.9109) \quad (\text{C.17})$$

$$\text{Knoxville:} \quad E = 56.055e^{8.1625 \cdot RC} \quad (r^2 = 0.9536) \quad (\text{C.18})$$

$$\text{Memphis:} \quad E = 65.115e^{8.7373 \cdot RC} \quad (r^2 = 0.9031) \quad (\text{C.19})$$

$$\text{Nashville:} \quad E = 80.012e^{7.68 \cdot RC} \quad (r^2 = 0.9455) \quad (\text{C.20})$$

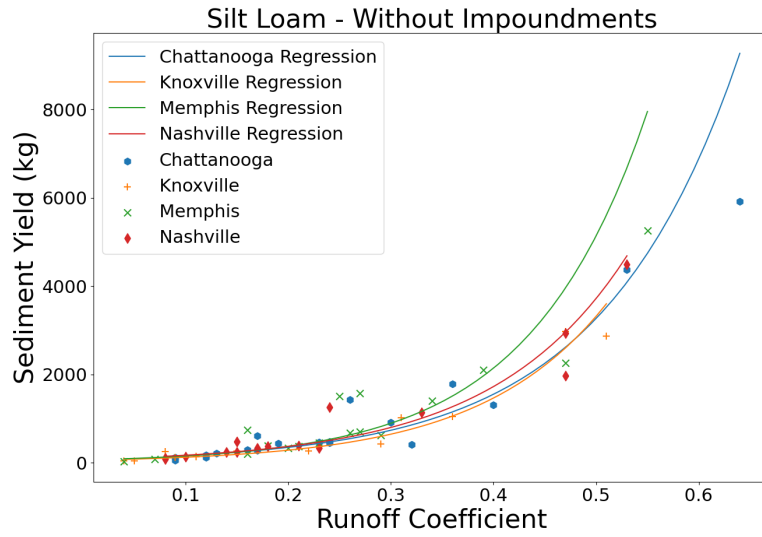


Figure C.5: Regressions by Climate - Without Impoundments - Silt Loam

$$\text{Chattanooga:} \quad E = 2.9712e^{7.6962 \cdot RC} \quad (r^2 = 0.6939) \quad (\text{C.21})$$

$$\text{Knoxville:} \quad E = 3.1577e^{7.8512 \cdot RC} \quad (r^2 = 0.7379) \quad (\text{C.22})$$

$$\text{Memphis:} \quad E = 3.0113e^{7.4478 \cdot RC} \quad (r^2 = 0.7736) \quad (\text{C.23})$$

$$\text{Nashville:} \quad E = 3.0314e^{7.7947 \cdot RC} \quad (r^2 = 0.7221) \quad (\text{C.24})$$

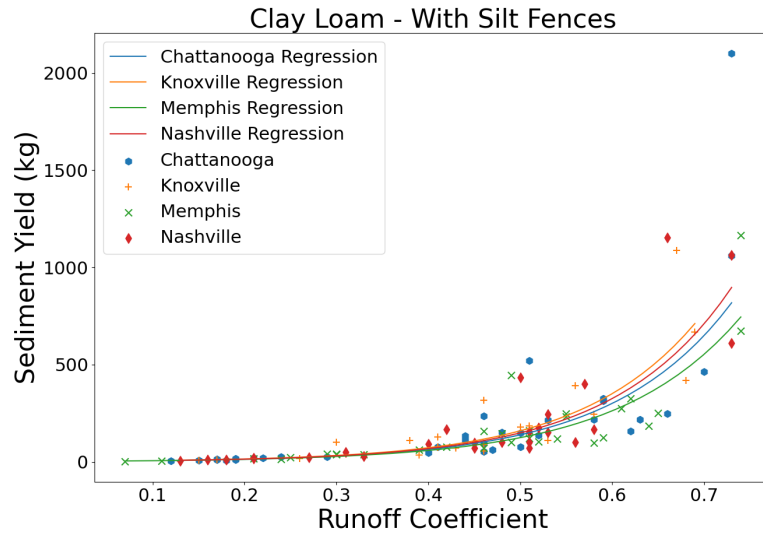


Figure C.6: Regressions by Climate - Silt Fence - Clay Loam

$$\text{Chattanooga:} \quad E = 32.792e^{6.7774 \cdot RC} \quad (r^2 = 0.8968) \quad (\text{C.25})$$

$$\text{Knoxville:} \quad E = 23.799e^{7.3809 \cdot RC} \quad (r^2 = 0.9197) \quad (\text{C.26})$$

$$\text{Memphis:} \quad E = 22.826e^{8.2666 \cdot RC} \quad (r^2 = 0.9036) \quad (\text{C.27})$$

$$\text{Nashville:} \quad E = 24.416e^{7.8778 \cdot RC} \quad (r^2 = 0.902) \quad (\text{C.28})$$

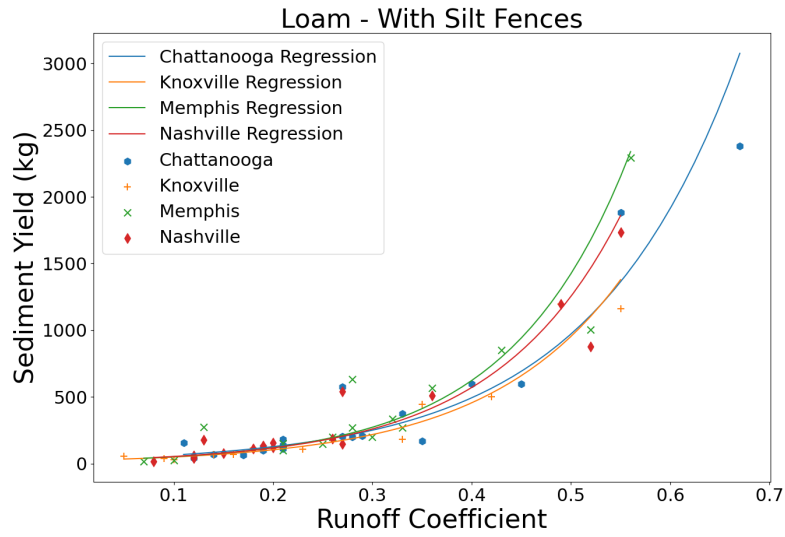


Figure C.7: Regressions by Climate - Silt Fence - Loam

$$\text{Chattanooga:} \quad E = 2.885e^{8.1619 \cdot RC} \quad (r^2 = 0.8419) \quad (\text{C.29})$$

$$\text{Knoxville:} \quad E = 3.0597e^{8.2202 \cdot RC} \quad (r^2 = 0.9158) \quad (\text{C.30})$$

$$\text{Memphis:} \quad E = 3.9957e^{7.4358 \cdot RC} \quad (r^2 = 0.8189) \quad (\text{C.31})$$

$$\text{Nashville:} \quad E = 3.0172e^{8.281 \cdot RC} \quad (r^2 = 0.914) \quad (\text{C.32})$$

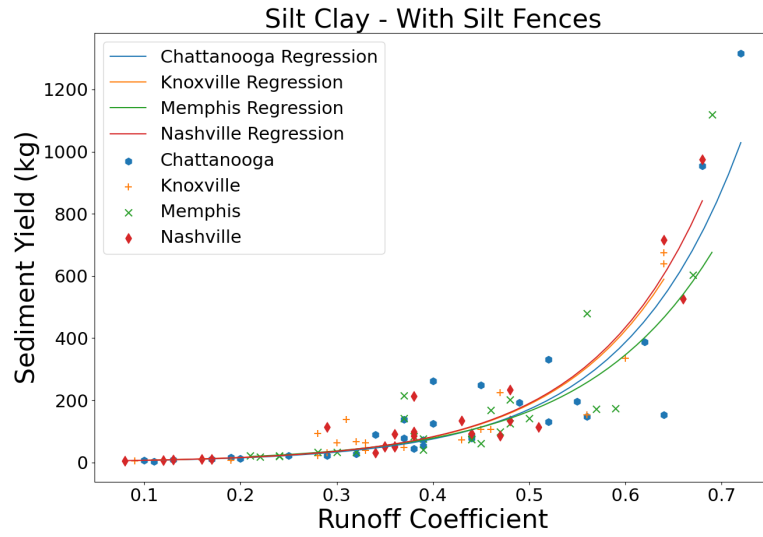


Figure C.8: Regressions by Climate - Silt Fence - Silt Clay

$$\text{Chattanooga:} \quad E = 13.86e^{7.2005 \cdot RC} \quad (r^2 = 0.9595) \quad (\text{C.33})$$

$$\text{Memphis:} \quad E = 10.663e^{8.3893 \cdot RC} \quad (r^2 = 0.8931) \quad (\text{C.34})$$

$$\text{Knoxville:} \quad E = 12.331e^{7.3865 \cdot RC} \quad (r^2 = 0.9752) \quad (\text{C.35})$$

$$\text{Nashville:} \quad E = 13.058e^{7.7889 \cdot RC} \quad (r^2 = 0.9147) \quad (\text{C.36})$$

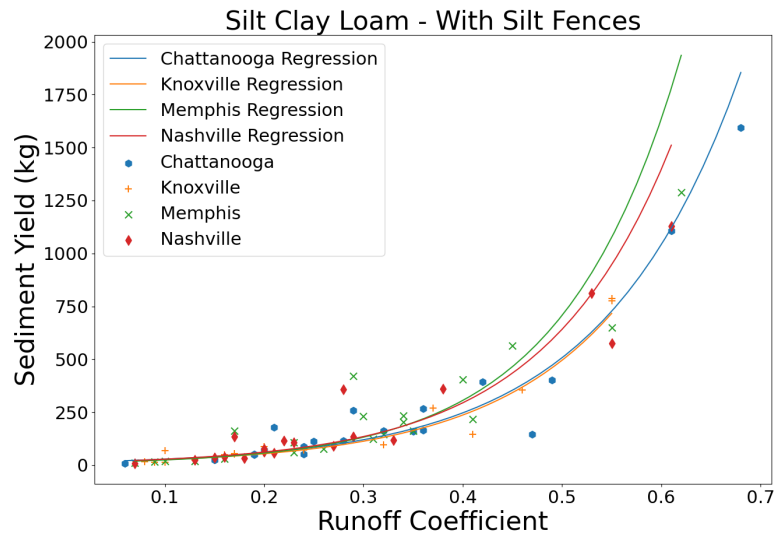


Figure C.9: Regressions by Climate - Silt Fence - Silt Clay Loam

$$\text{Chattanooga:} \quad E = 38.389e^{7.6791 \cdot RC} \quad (r^2 = 0.909) \quad (\text{C.37})$$

$$\text{Knoxville:} \quad E = 25.055e^{8.6275 \cdot RC} \quad (r^2 = 0.9506) \quad (\text{C.38})$$

$$\text{Memphis:} \quad E = 30.006e^{9.1496 \cdot RC} \quad (r^2 = 0.9083) \quad (\text{C.39})$$

$$\text{Nashville:} \quad E = 38.615e^{7.932 \cdot RC} \quad (r^2 = 0.9505) \quad (\text{C.40})$$

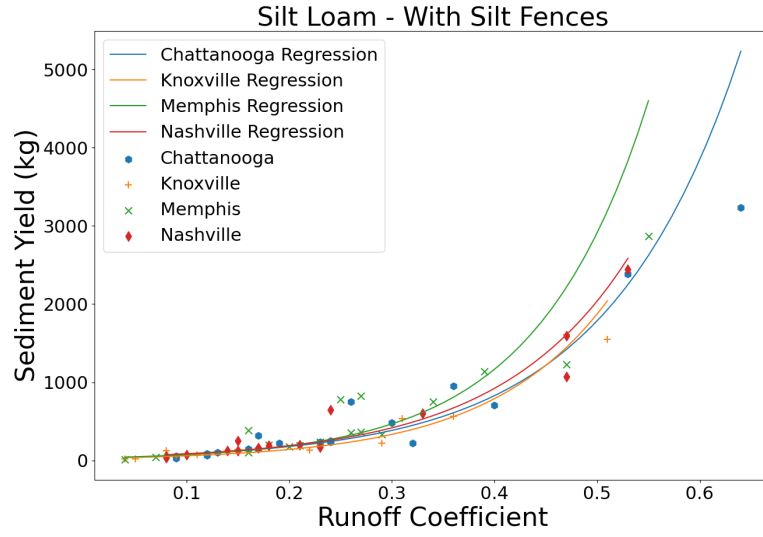


Figure C.10: Regressions by Climate - Silt Fence - Silt Loam

$$\text{Chattanooga:} \quad E = 3.6971e^{7.3564 \cdot RC} \quad (r^2 = 0.6852) \quad (\text{C.41})$$

$$\text{Knoxville:} \quad E = 3.8725e^{7.5211 \cdot RC} \quad (r^2 = 0.7365) \quad (\text{C.42})$$

$$\text{Memphis:} \quad E = 3.7889e^{7.0824 \cdot RC} \quad (r^2 = 0.7655) \quad (\text{C.43})$$

$$\text{Nashville:} \quad E = 3.7784e^{7.4446 \cdot RC} \quad (r^2 = 0.7227) \quad (\text{C.44})$$

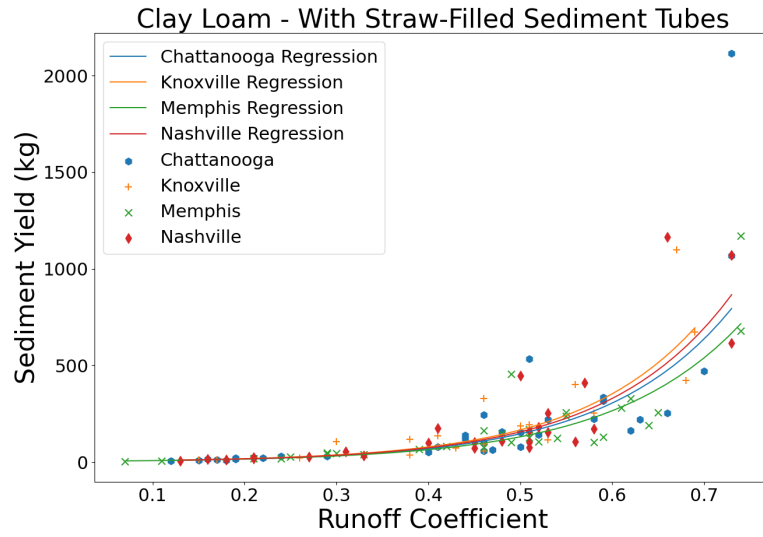


Figure C.11: Regressions by Climate - Straw-Filled Sediment Tubes - Clay Loam

$$\text{Chattanooga: } E = 35.866e^{6.6321 \cdot RC} \quad (r^2 = 0.8977) \quad (\text{C.45})$$

$$\text{Knoxville: } E = 26.943e^{7.1505 \cdot RC} \quad (r^2 = 0.9216) \quad (\text{C.46})$$

$$\text{Memphis: } E = 25.75e^{8.0283 \cdot RC} \quad (r^2 = 0.8973) \quad (\text{C.47})$$

$$\text{Nashville: } E = 27.578e^{7.6515 \cdot RC} \quad (r^2 = 0.8975) \quad (\text{C.48})$$

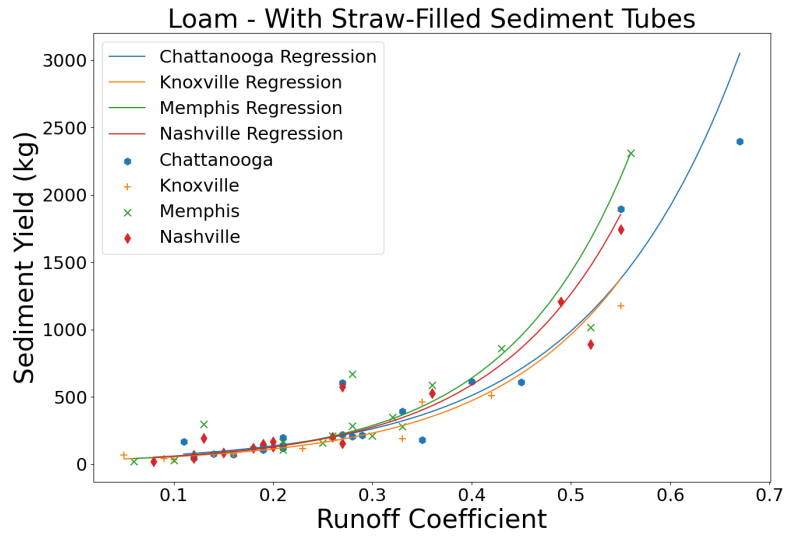


Figure C.12: Regressions by Climate - Straw-Filled Sediment Tubes - Loam

$$\text{Chattanooga:} \quad E = 3.246e^{7.9758 \cdot RC} \quad (r^2 = 0.8379) \quad (\text{C.49})$$

$$\text{Knoxville:} \quad E = 3.4457e^{8.0263 \cdot RC} \quad (r^2 = 0.9129) \quad (\text{C.50})$$

$$\text{Memphis:} \quad E = 4.4106e^{7.284 \cdot RC} \quad (r^2 = 0.8165) \quad (\text{C.51})$$

$$\text{Nashville:} \quad E = 3.493e^{8.0905 \cdot RC} \quad (r^2 = 0.9129) \quad (\text{C.52})$$

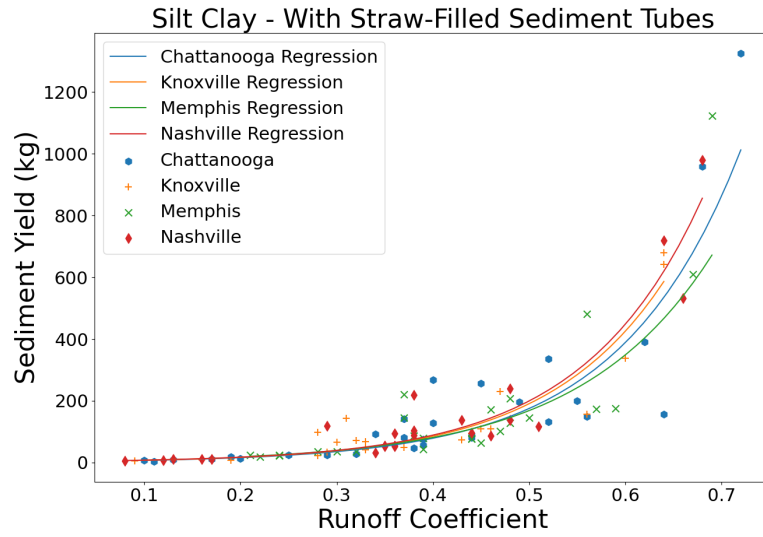


Figure C.13: Regressions by Climate - Straw-Filled Sediment Tubes - Silt Clay

$$\text{Chattanooga:} \quad E = 15.14e^{7.0485 \cdot RC} \quad (r^2 = 0.9586) \quad (\text{C.53})$$

$$\text{Knoxville:} \quad E = 13.51e^{7.2289 \cdot RC} \quad (r^2 = 0.9738) \quad (\text{C.54})$$

$$\text{Memphis:} \quad E = 11.487e^{8.2574 \cdot RC} \quad (r^2 = 0.8886) \quad (\text{C.55})$$

$$\text{Nashville:} \quad E = 14.181e^{7.6493 \cdot RC} \quad (r^2 = 0.9112) \quad (\text{C.56})$$

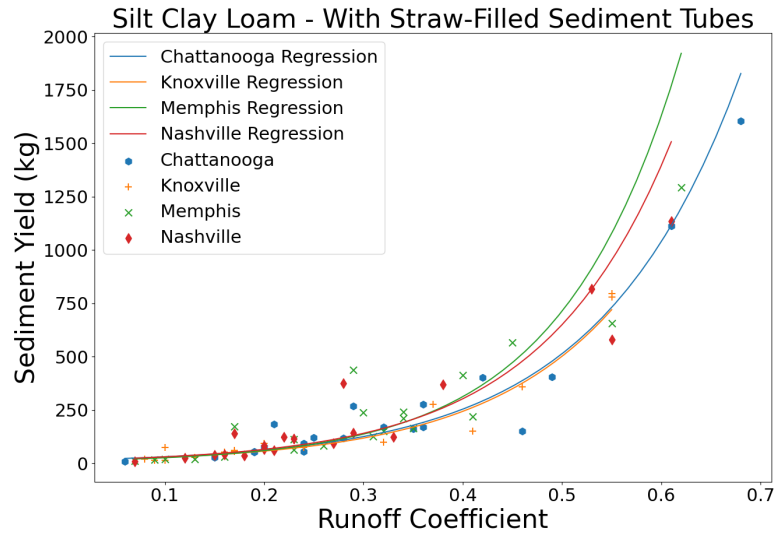


Figure C.14: Regressions by Climate - Straw-Filled Sediment Tubes - Silt Clay Loam

$$\text{Chattanooga:} \quad E = 43.419e^{7.4433 \cdot RC} \quad (r^2 = 0.9113) \quad (\text{C.57})$$

$$\text{Knoxville:} \quad E = 30.717e^{8.1671 \cdot RC} \quad (r^2 = 0.9535) \quad (\text{C.58})$$

$$\text{Memphis:} \quad E = 35.686e^{8.7422 \cdot RC} \quad (r^2 = 0.9031) \quad (\text{C.59})$$

$$\text{Nashville:} \quad E = 43.919e^{7.6795 \cdot RC} \quad (r^2 = 0.9456) \quad (\text{C.60})$$

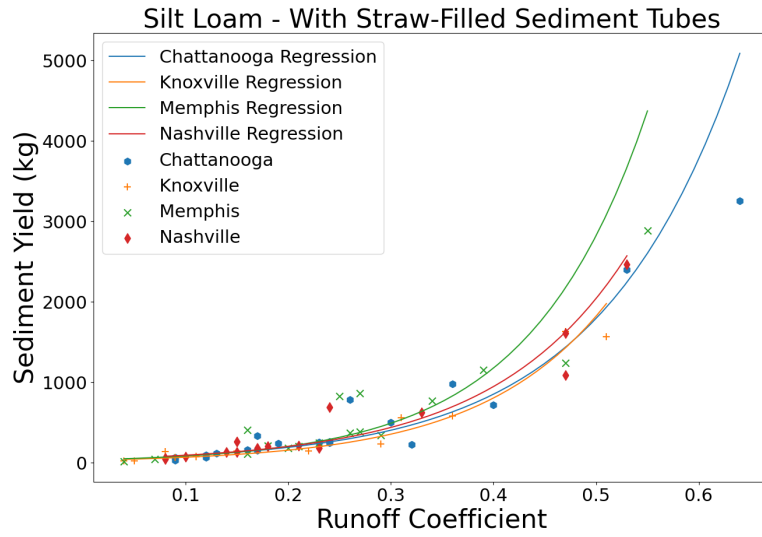


Figure C.15: Regressions by Climate - Straw-Filled Sediment Tubes - Silt Loam

D Statistical Analysis

In this section, ANOVA calculations are presented that show the similarity of P-factors for a given impoundment and soil type combination across the climate regions.

Table D.1: Anova - Silt Fence - Clay Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.0002	3	7.62127e-05	0.08	0.97	2.68
Within Groups	0.1026	113	0.00091			
Total	0.1029	116				

Table D.2: Anova - Silt Fence - Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.00075	3	0.00025	1.428	0.243	2.751
Within Groups	0.01096	63	0.00017			
Total	0.01171	66				

Table D.3: Anova - Silt Fence - Silt Clay

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.00028	3	9.29976e-05	0.813	0.490	2.697
Within Groups	0.01121	98	0.00011			
Total	0.01149	101				

Table D.4: Anova - Silt Fence - Silt Clay Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.00024	3	8.156e-05	1.244	0.300	2.727
Within Groups	0.00492	75	6.557e-05			
Total	0.00516	78				

Table D.5: Anova - Silt Fence - Silt Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.0055	3	0.00184	2.009	0.122	2.753
Within Groups	0.0569	62	0.00092			
Total	0.0624	65				

Table D.6: Anova - Silt Fence - Total

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.80	4	0.45	990.51	3.522e-214	2.39
Within Groups	0.19	426	0.0005			
Total	1.99	430				

Table D.7: Anova - Straw-Filled Sediment Tubes - Clay Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.13413e-05	3	7.114e-06	1.231	0.302	2.685
Within Groups	0.00065	113	5.781e-06			
Total	0.00067	116				

Table D.8: Anova - Straw-Filled Sediment Tubes - Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.672e-07	3	8.905e-08	0.348	0.791	2.746
Within Groups	1.664e-05	65	2.560e-07			
Total	1.691e-05	68				

Table D.9: Anova - Straw-Filled Sediment Tubes - Silt Clay

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	6.28556e-06	3	2.095e-06	1.813	0.150	2.697
Within Groups	0.00011	98	1.156e-06			
Total	0.00012	101				

Table D.10: Anova - Straw-Filled Sediment Tubes - Silt Clay Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	3.398E-06	3	1.133e-06	1.970	0.126	2.727
Within Groups	4.312e-05	75	5.749e-07			
Total	4.652e-05	78				

Table D.11: Anova - Straw-Filled Sediment Tubes - Silt Loam

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	4.610e-06	3	1.537e-06	1.517	0.219	2.753
Within Groups	6.280e-05	62	1.013e-06			
Total	6.741e-05	65				

Table D.12: Anova - Straw-Filled Sediment Tubes - Total

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.34786	4	0.587	271603.329	0.000	2.393
Within Groups	0.00092	428	2.161e-06			
Total	2.34879	432				

E Sediment Erosion Breakdown

The output data of the numerical simulations was analyzed to determine the amount of soil eroded for each component of the soil. [Table E.1](#) includes the breakdown of the P-factor for each soil component.

Table E.1: Soil Composition Breakdown of the P-Factor for Silt Fences

Soil	Location	Soil Composition	Inflow (kg)	Outflow (kg)	Retained (kg)	Efficiency
Clay Loam	Chattanooga	Clay	1210.0	1123.0	87.20	0.93
		Silt	1203.0	1181.0	22.15	0.98
		Sand	829.5	1.5	828.00	0.00
	Knoxville	Clay	774.3	715.5	58.89	0.92
		Silt	770.3	751.9	18.44	0.98
		Sand	531.0	1.1	529.90	0.00
	Memphis	Clay	888.4	821.5	66.88	0.92
		Silt	883.8	866.0	17.77	0.98
		Sand	609.2	1.5	607.70	0.00
	Nashville	Clay	913.7	845.4	68.23	0.93
		Silt	909.0	890.5	18.44	0.98
		Sand	626.5	1.5	625.00	0.00
Loam	Chattanooga	Clay	1338.0	1232.0	105.80	0.92
		Silt	1526.0	1489.0	36.49	0.98
		Sand	2144.0	13.3	2130.00	0.01
	Knoxville	Clay	688.7	631.8	56.90	0.92
		Silt	785.3	759.2	26.12	0.97
		Sand	1103.0	11.8	1092.00	0.01
	Memphis	Clay	688.7	631.8	56.90	0.92
		Silt	785.3	759.2	26.12	0.97
		Sand	1103.0	11.8	1092.00	0.01
	Nashville	Clay	1008.0	923.2	85.12	0.92
		Silt	1150.0	1116.0	33.92	0.97
		Sand	1615.0	12.9	1603.00	0.01
Silt Clay Loam	Chattanooga	Clay	1540.0	1420.0	120.20	0.92
		Silt	818.8	800.4	18.37	0.98
		Sand	336.5	1.1	335.40	0.00
	Knoxville	Clay	1540.0	1420.0	120.20	0.92
		Silt	818.8	800.4	18.37	0.98
		Sand	336.5	1.1	335.40	0.00
	Memphis	Clay	1445.0	1327.0	117.80	0.92
		Silt	768.2	748.4	19.79	0.97
		Sand	315.7	0.7	315.00	0.00
	Nashville	Clay	1202.0	1102.0	100.50	0.92
		Silt	639.2	621.3	17.90	0.97
		Sand	262.7	1.6	261.10	0.01
Silt Clay	Chattanooga	Clay	1825.0	1691.0	133.90	0.93
		Silt	1332.0	1306.0	25.26	0.98
		Sand	79.2	0.1	79.12	0.00
	Knoxville	Clay	1071.0	987.2	83.42	0.92
		Silt	781.3	761.6	19.77	0.97
		Sand	46.5	0.2	46.32	0.00
	Memphis	Clay	1484.0	1372.0	112.00	0.92
		Silt	1083.0	1062.0	20.67	0.98
		Sand	64.5	0.1	64.32	0.00
	Nashville	Clay	1364.0	1261.0	103.20	0.92
		Silt	995.2	974.4	20.77	0.98
		Sand	59.2	0.1	59.15	0.00
Silt Loam	Chattanooga	Clay	1076.0	990.5	85.46	0.92
		Silt	2459.0	2397.0	61.80	0.97
		Sand	1823.0	8.2	1815.00	0.00
	Knoxville	Clay	535.8	490.2	45.51	0.91
		Silt	1224.0	1180.0	44.74	0.96
		Sand	907.6	9.5	898.10	0.01
	Memphis	Clay	1015.0	928.7	86.54	0.91
		Silt	2320.0	2254.0	66.37	0.97
		Sand	1720.0	5.0	1715.00	0.00
	Nashville	Clay	786.6	720.8	65.75	0.92
		Silt	1798.0	1745.0	53.08	0.97
		Sand	1333.0	12.9	1320.00	0.01

Vita

Karen Wynne Abercrombie is from a small town in East Tennessee. Throughout high school she was extremely active in extracurriculars and graduated in May 2017 as the Valedictorian of her class. She has continued this work ethic throughout college to achieve Summa Cum Laude for a Bachelors of Science in Civil Engineering with a minor in Watersheds from the Department of Civil and Environmental Engineering at the University of Tennessee - Knoxville (UTK), while being a very active participant in the American Society of Civil Engineers (ASCE) and honors programs (Tau Beta Phi, 1794 Honors Program, and Chi Epsilon). She further pursued her interest in civil engineering by participating in an internship at Oak Ridge National Laboratory (ORNL) and contributing to research for Dr. Jon Hathaway and Dr. Khalid Alshibli. She continued her research relations into graduate school working for both Dr. Jon Hathaway and Dr. John Schwartz after obtaining her undergraduate degree in December 2020. Karen received her Masters of Science in Environmental Engineering in December 2022.