Module 5 - Perimeter Control Systems and Sediment Containment

Estimated Reading Time: 60-75 minutes / Estimated Completion Time: ~ 1 hour 15 minutes

Recommended Audience: Civil Engineers, Land Development Professionals, Erosion Control Specialists, Erosion Control Inspectors, Municipal Officials, MS 4 Program Managers, Utility Contractors, Highway and Road Builders, Construction Inspectors, Contractors and Superintendents, Developers and Property Owners, Estimators and Project Managers, Sales Professionals, Students of Civil Infrastructure, Anyone seeking a foundational understanding of erosion control, sediment management, and perimeter control Best Management Practices (BMPs).

Understanding How Construction Sites Keep Sediment On-Site and Protect Downstream Waters

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Introduction

In Module 4, we learned how rainfall becomes runoff and how stormwater moves across a developed site. We examined the hydrologic cycle, runoff calculations, drainage areas, storm sewer systems, detention, and water quality treatment. Those topics focused on understanding what happens after rain falls and enters the stormwater system.

This module takes a step back in the process.

Before runoff reaches a catch basin, storm sewer, detention pond, or water quality treatment system, it first travels across the construction site. During that journey, runoff has the potential to detach soil particles, transport sediment, create erosion, and carry pollutants beyond the project limits. One of the primary goals of erosion and sediment control is to manage that water before it ever reaches the storm drainage system.

Every construction project begins with disturbance. Vegetation is removed. Topsoil is stripped. Grading operations reshape the landscape. Areas that once absorbed rainfall become exposed to erosion, runoff, and sediment transport. From that moment forward, one of the contractor's most important responsibilities is controlling how water moves across the site and preventing sediment from leaving the project.

Sediment is the most common pollutant associated with construction activities. When soil is carried off-site by stormwater runoff, the impacts extend far beyond the construction limits. Sediment can clog storm drainage systems, reduce the storage capacity of detention ponds, impair streams and wetlands, damage infrastructure, increase maintenance costs, and create regulatory violations for contractors, developers, and property owners alike.

For this reason, perimeter controls are among the first Best Management Practices (BMPs) installed on a construction site and often remain in place until final stabilization has been achieved. Products such as silt fence, straw wattles, filter sock, sediment tubes, and Erosion Eels have become familiar sights on construction projects throughout Tennessee and across the country. Yet despite their widespread use, many people never develop a true understanding of how these systems function, why they are selected, or why some installations consistently outperform others.

One of the biggest misconceptions about perimeter controls is that they exist solely to filter sediment from runoff. While filtration is certainly one component of their performance, effective perimeter controls do much more. They intercept runoff, reduce flow velocity, interrupt slope length, encourage sediment deposition, contain displaced soil, and help manage how water moves across disturbed ground. In many ways, perimeter controls represent the first opportunity to influence runoff before it reaches the engineered stormwater infrastructure discussed in the previous module.

The effectiveness of any perimeter control system depends on understanding the conditions it is intended to address. A product that performs exceptionally well on one project may perform poorly on another. Drainage area, slope length, runoff volume, flow concentration, maintenance requirements, installation quality, and regulatory requirements all influence how a BMP performs in the field.

Throughout this module, we will examine both traditional and modern perimeter control technologies, including commercial and transportation-grade silt fence systems, advanced sediment barriers, sediment tubes, straw wattles, filter sock, Erosion Eels, coir products, construction entrances, and other specialty BMPs. More importantly, we will examine the principles that govern their selection and use.

The objective of this module is not simply to teach product knowledge. It is to develop a practical understanding of how water and sediment behave on an active construction site, how perimeter controls function within the overall stormwater management process, and how experienced erosion control professionals evaluate site conditions before selecting a solution.

When understood properly, perimeter controls become much more than temporary construction products. They become the first step in protecting downstream infrastructure, preserving water quality, reducing project risk, and managing stormwater before it ever enters the drainage system.

Module Learning Objectives

Upon completing this module, students will develop a practical understanding of the principles, products, and decision-making processes that form the foundation of perimeter erosion and sediment control. Participants will learn how runoff behaves immediately after rainfall, how sediment becomes detached and transported across disturbed sites, and why perimeter controls represent the first opportunity to manage stormwater before it enters the engineered drainage system.

Throughout the course, students will distinguish between sheet flow and concentrated flow, examine how drainage area, slope length, and runoff velocity influence BMP performance, and develop a working knowledge of the most common perimeter control products used throughout the construction industry. Topics include traditional and advanced silt fence systems, sediment tubes, straw wattles, filter sock technologies, Erosion Eels, construction entrances, and specialty perimeter control BMPs.

Students will also explore the differences between commercial and TDOT silt fence systems, anchored and weighted sediment barriers, various sediment tube fill materials, proper staking and installation techniques, slope interruption strategies, and the practical application of perimeter controls around disturbed slopes and construction entrances. Along the way, they will learn to recognize common installation mistakes, understand inspection and maintenance requirements, and identify the causes of typical BMP failures before they become costly field problems.

Finally, participants will develop a structured approach to evaluating perimeter control systems using TerrainIQ field logic. By learning to evaluate runoff, sediment movement, site conditions, and project requirements before selecting a product, students will be better prepared to communicate with contractors, inspectors, engineers, developers, municipalities, and project owners while making more informed decisions in the field.

Finally, participants will develop a structured approach to evaluating perimeter control systems using TerrainIQ field logic, enabling them to communicate more effectively with contractors, inspectors, engineers, developers, and project owners while making better-informed decisions in the field.

CHAPTER 1 - Fundamentals of Perimeter Controls

Runoff, Sediment Movement, Stabilization, and BMP Limitations

In Module 4, we learned how rainfall becomes runoff and how stormwater moves across a developed site. Before that runoff ever reaches a catch basin, storm sewer, detention system, or water quality treatment device, it must first travel across the construction site. It is during this stage that erosion begins and sediment is transported. Perimeter controls represent the first opportunity to influence how stormwater behaves before it enters the engineered drainage system.

Every erosion and sediment control plan begins with a simple objective: keep soil where it belongs.
When a construction project disturbs the natural landscape, vegetation is removed, soils are exposed, and rainfall gains direct access to bare ground. Once this occurs, runoff can detach soil particles and transport them across the site and beyond the project boundaries.

The consequences of sediment leaving a construction site can be significant. Sediment can clog storm drainage systems, reduce detention pond capacity, impair streams and wetlands, degrade water quality, damage aquatic habitat, create safety concerns, increase long-term maintenance costs, and expose contractors, developers, and property owners to regulatory enforcement.

Perimeter controls are designed to interrupt this process. While no perimeter control can eliminate erosion entirely, properly selected and maintained BMPs can significantly reduce runoff velocity, encourage sediment deposition, interrupt slope length, contain displaced soil, and help protect downstream infrastructure and receiving waters.

One of the central themes of this module is that perimeter controls are not simply sediment barriers. They are water management tools. By controlling how water moves across a disturbed site, they reduce erosion at its source and help prevent sediment from ever entering the stormwater collection system.
Understanding perimeter controls, therefore, begins with understanding how water behaves, how sediment moves, and how experienced erosion control professionals evaluate site conditions before selecting the appropriate solution.

1.1 What Are Perimeter Controls?

Perimeter controls are temporary or permanent Best Management Practices (BMPs) designed to intercept stormwater runoff, reduce flow velocity, contain sediment, and minimize the movement of soil beyond the limits of a construction site. They represent one of the first lines of defense against sediment pollution and are typically among the earliest erosion and sediment control measures installed during site development.

Most perimeter controls are installed along the downslope edges of disturbed areas where runoff is expected to leave the project. Their purpose is not to stop water entirely, but to manage how water leaves the site. By slowing runoff and encouraging suspended soil particles to settle before reaching adjacent properties, roadways, drainage systems, streams, wetlands, or other environmentally sensitive areas, these BMPs help reduce the off-site impacts associated with construction activities.

As construction methods, environmental regulations, and stormwater management practices have evolved, so too have the perimeter control technologies used to protect construction sites. The industry now offers a wide variety of solutions ranging from traditional silt fence systems and fiber rolls to advanced sediment barriers, weighted sediment tubes, compost-based filtration systems, and specialized products developed for environmentally sensitive or high-performance applications. While these products may differ significantly in their materials, installation methods, durability, and performance characteristics, they all share a common objective: controlling how water moves across a disturbed site and reducing the amount of sediment that leaves the project.

One of the central themes of this module is that successful erosion control does not begin with selecting a product. It begins with understanding the site. Factors such as drainage area, slope length, runoff volume, flow characteristics, maintenance expectations, construction phasing, and regulatory requirements should always guide the selection process. When these conditions are properly evaluated, the most appropriate perimeter control often becomes clear.

By the end of this module, you should find yourself thinking less in terms of individual products and more in terms of matching the right BMP to the right application. That shift in thinking—from choosing products to solving problems—is one of the defining characteristics of experienced erosion control professionals and one of the foundational principles of TerrainIQ.

1.2 Why Sediment Control Matters

Sediment is the most common pollutant associated with construction activities and one of the primary reasons erosion and sediment control regulations exist. Unlike many pollutants that originate from industrial processes, chemical releases, or wastewater discharges, sediment is created whenever soil becomes exposed and vulnerable to erosion. Every grading operation, utility trench, building pad, roadway excavation, or stockpile has the potential to generate sediment if rainfall occurs before the site is stabilized.

Construction sites often contain thousands, and sometimes hundreds of thousands, of square feet of disturbed soil. Even relatively small rainfall events can detach soil particles and transport them downslope if adequate perimeter controls are not in place. Because of this, sediment control becomes one of the most important environmental responsibilities on any construction project.

The effects of uncontrolled sediment extend far beyond the construction site. As runoff carries soil into the stormwater system, sediment begins to accumulate in catch basins, storm sewer pipes, culverts, detention ponds, and drainage channels. Over time, this buildup reduces the capacity of the infrastructure designed to manage stormwater, increases maintenance costs, and shortens the useful life of public and private stormwater facilities. Once sediment reaches streams and wetlands, it can reduce water clarity, bury aquatic habitat, alter natural stream channels, and degrade the overall health of the watershed.

Sediment also creates another problem that is often overlooked. Soil particles rarely travel alone. Nutrients, fertilizers, hydrocarbons, heavy metals, and other pollutants frequently attach themselves to sediment and are transported together by stormwater runoff. In many respects, sediment acts as the delivery system for many of the pollutants discussed in Module 1. Preventing sediment from leaving the site often prevents multiple pollutants from reaching downstream waterways.

Perhaps the most important lesson for contractors, developers, and property owners is that sediment control is almost always less expensive than sediment removal. Installing and maintaining effective perimeter controls requires planning and routine maintenance, but once sediment leaves the site, the costs increase rapidly. Cleanup efforts, damaged infrastructure, environmental restoration, regulatory enforcement, project delays, and dissatisfied clients can quickly exceed the cost of properly managing erosion in the first place.

Successful erosion control is not simply about complying with regulations. It is about protecting infrastructure, preserving water quality, reducing long-term maintenance costs, and managing stormwater responsibly before it ever reaches the drainage system.

1.3 How Sediment Moves

Before selecting a perimeter control, it is important to understand how sediment is transported. Every perimeter control discussed throughout this module is designed to interrupt the same natural process. Once you understand how sediment moves, the purpose behind nearly every erosion control BMP becomes much easier to understand.

Sediment does not move on its own. It requires energy. On construction sites, that energy is supplied primarily by rainfall and stormwater runoff. As raindrops strike exposed soil, they begin breaking loose individual soil particles. Once runoff begins flowing across the disturbed surface, those detached particles are carried downhill by moving water.

The movement of sediment generally occurs in four stages.

The process begins with **detachment**, when the force of falling rain breaks soil particles loose from the ground surface. Bare, unprotected soil is particularly vulnerable because there is little vegetation or surface cover to absorb the impact of rainfall.

Once detached, the soil enters the **transport** phase. Stormwater runoff provides the energy needed to carry sediment across the construction site. As runoff travels downslope, it often gains both volume and velocity, increasing its ability to transport larger quantities of soil.

Eventually, runoff begins to lose energy. This is known as the **deposition** phase. As water slows, it can no longer keep heavier soil particles suspended, causing them to settle onto the ground. This simple principle is one of the primary reasons perimeter controls are effective. Most BMPs are designed to reduce runoff velocity, allowing sediment to settle before it leaves the site.

Over time, repeated deposition leads to **accumulation**. Sediment collects in low areas, behind perimeter controls, within temporary ponds, inside storm drainage structures, or anywhere runoff slows sufficiently to lose carrying capacity. This accumulation is evidence that the BMP is performing its intended function, although excessive buildup eventually requires maintenance to restore the system's effectiveness.

One of the most important concepts to remember throughout this module is that perimeter controls rarely stop water. Instead, they reduce the energy contained within moving water. As runoff loses velocity, it loses its ability to detach, transport, and carry sediment. In many respects, successful erosion control is simply the practice of managing the energy of stormwater before it reaches the drainage system.

Understanding this relationship between water, energy, and sediment provides the foundation for nearly every perimeter control technology discussed in the chapters that follow.

1.4 Sheet Flow and Concentrated Flow

One of the most important concepts in erosion and sediment control is understanding the difference between sheet flow and concentrated flow. In fact, this single concept influences the selection, placement, and performance of nearly every perimeter control discussed throughout this module.

Sheet flow occurs when stormwater runoff spreads relatively evenly across the surface of the ground. Rather than flowing in a defined channel, the water moves as a broad, shallow layer over the soil. Sheet flow is commonly encountered on disturbed building pads, graded slopes, open construction sites, utility corridors, and other areas where runoff has not yet collected into a concentrated path.

Because runoff remains shallow and relatively uniform, its velocity is generally lower than concentrated flow, making it easier to manage with perimeter controls. Traditional silt fence, filter sock, sediment tubes, straw wattles, and many other BMPs are specifically designed to perform under these conditions. Their purpose is to intercept this shallow runoff, reduce its velocity, and encourage suspended sediment to settle before leaving the site.

As runoff continues downslope, however, the situation often changes. Water naturally seeks the path of least resistance. Small depressions begin collecting additional runoff, flow paths become more defined, and shallow sheet flow gradually transforms into **concentrated flow**. Once this occurs, both the depth and velocity of the runoff increase, along with its ability to detach and transport sediment.

Concentrated flow is commonly found within swales, ditches, temporary drainage channels, low areas, roadside conveyances, and other locations where runoff has become channelized. These areas contain substantially more energy than sheet flow and often require different erosion control strategies. Products designed to manage shallow sheet flow may quickly become overwhelmed when subjected to concentrated runoff.

One of the most common causes of perimeter control failure occurs when a BMP intended for sheet flow is installed in a concentrated flow application. The product itself may be installed correctly and function exactly as designed, yet still fail because it was selected for conditions outside its intended use. In many cases, what appears to be a product failure is actually a site evaluation failure.

Throughout this module, one question should be asked before selecting any perimeter control: **"Am I managing sheet flow or concentrated flow?"** The answer to that question will often determine which BMP is most appropriate and which products should be avoided altogether.

Understanding this distinction is one of the first steps toward thinking like an experienced erosion control professional. Before selecting a product, learn to identify how water is moving across the site. Once you understand the flow, the appropriate solution often becomes much more apparent.

1.5 The Four Functions of Perimeter Controls

Although perimeter controls come in many shapes, sizes, and configurations, nearly every system discussed throughout this module works by influencing stormwater in one or more fundamental ways. Understanding these principles is far more valuable than memorizing individual products because the same concepts apply whether the BMP is a traditional silt fence, a straw wattle, a filter sock, an Erosion Eel, or a specialty perimeter control system. When evaluating any perimeter control, ask yourself one simple question:

"What is this BMP trying to do to the water?"

In most cases, the answer will involve one or more of the following four functions.

Interception

The first function of a perimeter control is interception. Before runoff can leave the disturbed area, it must first encounter the BMP. The perimeter control intercepts the moving water and changes its path, forcing runoff to slow, spread out, or temporarily pond before continuing downstream.

Think of interception as placing an obstacle in the path of flowing water. The objective is not to stop runoff completely but to interrupt its movement long enough for other erosion control processes to occur.

Filtration

Many perimeter controls also provide filtration by allowing water to pass through the system while capturing larger suspended soil particles. As runoff moves through or around the BMP, vegetation, fibers, compost, geotextiles, or other filtering media remove a portion of the suspended sediment before the water continues downstream.

It is important to understand, however, that filtration alone is not responsible for most sediment removal. One of the biggest misconceptions in erosion control is assuming that perimeter controls function like coffee filters. In reality, most sediment is removed because water slows down, not simply because it passes through a filtering material.

Velocity Reduction

Perhaps the most important function of any perimeter control is reducing the velocity of runoff.
Moving water contains energy. The faster water travels, the greater its ability to detach soil particles, transport sediment, erode slopes, and damage downstream infrastructure. Nearly every perimeter control discussed in this module is designed to reduce that energy.

As runoff slows, its ability to carry sediment decreases dramatically. Larger soil particles settle first, followed by progressively finer materials as water continues to lose velocity. This principle explains why slowing water is often more effective than attempting to stop it altogether.

Throughout this module, remember this simple relationship:
Less velocity equals less energy. Less energy equals less erosion.

Containment
The final function of many perimeter controls is containment.
As runoff slows behind a BMP, water and sediment are temporarily stored within a shallow impoundment. This temporary storage provides additional time for suspended soil particles to settle before runoff continues downstream.

Containment does not mean permanently holding water. Instead, it creates a brief opportunity for nature to do the work. Gravity begins separating soil particles from the runoff, allowing sediment to remain on-site while cleaner water continues through the system.

Many perimeter controls are intentionally designed to create this temporary ponding effect because deposition is one of the most effective methods of sediment control.

Working Together
Although these four functions have been discussed separately, they rarely occur independently. Most perimeter controls perform several of these functions simultaneously. A silt fence, for example, intercepts runoff, reduces its velocity, provides limited filtration, and temporarily contains water long enough for sediment to settle. A filter sock performs many of these same functions using different materials and construction methods. Even advanced systems such as Erosion Eels rely on these same fundamental principles.

Once you understand these four mechanisms, the differences between perimeter control products become much easier to understand. Rather than focusing on what a product is called, begin evaluating how it manages water. That perspective provides a much stronger foundation for selecting the right BMP for the right application and is one of the key principles behind the TerrainIQ decision-making process.

1.6 Understanding BMP Limitations
One of the most common misconceptions in erosion and sediment control is believing that installing a BMP solves the problem.

It does not.

Perimeter controls are designed to reduce risk, not eliminate it. Like every engineered system discussed throughout Terrain Civil University, they are intended to perform within a defined set of conditions. When those conditions are exceeded, performance declines and failure becomes increasingly likely.

Understanding the limitations of a BMP is just as important as understanding its capabilities.
For example, no perimeter control can prevent erosion entirely. If rainfall intensity exceeds the site's ability to absorb or safely convey runoff, erosion will still occur. Likewise, no perimeter control can manage an unlimited

drainage area. Every BMP has a practical capacity based on the amount of runoff, sediment loading, and hydraulic energy it was designed to handle.

Maintenance also plays a critical role in performance. A properly selected and installed perimeter control that is never inspected or maintained will eventually lose its effectiveness. Sediment accumulates, runoff begins bypassing the system, structural components deteriorate, and what was once an effective BMP can quickly become a point of failure.

Perimeter controls also cannot compensate for poor site planning or improper grading. If runoff is intentionally or unintentionally directed into concentrated flow paths beyond the capacity of the selected BMP, even the highest-quality product may fail. In many cases, what appears to be a product failure is actually the result of poor drainage design or an incorrect application.

Another important limitation is that perimeter controls should never be viewed as a substitute for stabilization. Preventing erosion is almost always more effective than attempting to capture sediment after it has already become suspended in runoff. Temporary seeding, permanent vegetation, erosion control blankets, mulch, and other stabilization practices remain some of the most effective erosion control tools available because they reduce erosion at its source rather than attempting to manage it after it has begun.

Perhaps the most important lesson is that perimeter controls work best as part of a complete erosion and sediment control system. Stabilization reduces the amount of exposed soil. Diversion practices redirect runoff away from vulnerable areas. Perimeter controls intercept the runoff that remains. Sediment basins, check dams, inlet protection, and other BMPs provide additional layers of protection before runoff ultimately reaches the stormwater system.

No single BMP is expected to solve every problem.

Instead, successful erosion control relies on multiple practices working together, with each BMP performing the function for which it was designed. Understanding those limitations—and respecting them—is one of the defining characteristics of experienced erosion control professionals and one of the guiding principles behind the TerrainIQ approach to site evaluation.

1.7 Stabilization Comes First

One of the most common mistakes on construction sites is placing too much emphasis on perimeter controls while overlooking the importance of stabilization. Although perimeter controls are essential components of an erosion and sediment control plan, they should never be considered the first or only line of defense.

Perimeter controls are primarily reactive. They manage sediment after erosion has already occurred by slowing runoff, encouraging sediment deposition, and preventing displaced soil from leaving the project. Stabilization, on the other hand, is proactive. Its purpose is to prevent erosion from occurring in the first place.

This distinction is important because every soil particle that remains in place is one less particle that must be intercepted, filtered, or contained downstream.

Stabilization can take many forms depending on the stage of construction, the expected duration of disturbance, and the project requirements. Temporary vegetation may be established on inactive portions of the site until construction resumes. Permanent seeding provides long-term stabilization once final grades have been achieved.

Hydromulch protects newly seeded areas while promoting germination. Erosion control blankets and turf reinforcement mats shield vulnerable slopes from rainfall impact while vegetation becomes established. Even simple practices such as preserving existing vegetation or minimizing the amount of disturbed soil can significantly reduce erosion potential.

These practices all share a common objective: protecting the soil surface before runoff has the opportunity to detach and transport sediment.

Throughout this module, remember that perimeter controls should rarely be viewed as standalone solutions. They perform best when used as one component of a comprehensive erosion and sediment control strategy that includes stabilization, runoff management, diversion practices, and routine maintenance. Each practice addresses a different stage in the erosion process, and together they provide multiple layers of protection.
One of the guiding principles of erosion control is simple:

"It is almost always easier, less expensive, and more effective to prevent erosion than it is to capture sediment after it has already begun moving."

That philosophy extends beyond perimeter controls and serves as one of the foundational principles of modern stormwater management. Successful projects do not simply manage sediment after it moves - they reduce the opportunity for sediment to move in the first place.

1.8 Why Perimeter Controls Fail

One of the most common misconceptions in erosion and sediment control is assuming that when a BMP fails, the product itself is to blame. While manufacturing defects occasionally occur, they are relatively uncommon. Most perimeter control failures are not product failures - they are application failures.

In many cases, the BMP performed exactly as it was designed to perform. The problem was that it was installed under conditions for which it was never intended. A silt fence designed to manage shallow sheet flow may fail when subjected to concentrated runoff. A properly installed straw wattle may be displaced because the drainage area exceeds its intended capacity. A filter sock may become overwhelmed simply because maintenance was neglected or sediment was allowed to accumulate beyond acceptable levels.

Successful erosion control depends on matching the right BMP to the right application. Product selection is important, but it is only one part of the decision-making process. Installation quality, drainage area, runoff volume, slope length, maintenance practices, construction phasing, and site stabilization all have a direct influence on performance. Ignoring any one of these factors can significantly reduce the effectiveness of an otherwise well-designed system.

Throughout this module, we will repeatedly encounter examples where the correct product was installed in the wrong location or where a properly selected BMP failed because site conditions changed during construction. These examples reinforce an important lesson: the performance of a perimeter control cannot be evaluated independently from the conditions under which it is used.

One of the goals of Terrain Civil University is to move beyond simply recognizing erosion control products and begin understanding why they are selected. The most experienced erosion control professionals spend very little time asking, "Which product should I install?" Instead, they ask, "What conditions am I trying to manage?" Once that question is answered, the most appropriate BMP often becomes obvious.

This philosophy forms one of the foundational principles of TerrainIQ. Successful erosion control begins with evaluating the site, understanding how water behaves, recognizing the limitations of each BMP, and then selecting the product that best matches the conditions. In other words, understand the problem first. The solution usually follows.

Chapter Summary

One of the biggest differences between someone who understands erosion control products and someone who understands erosion control is how they approach a problem.

Less experienced professionals often begin by asking, *"Which product should I use?"* Experienced professionals begin somewhere entirely different. They first study the site, observe how water moves, determine whether runoff exists as sheet flow or concentrated flow, evaluate the contributing drainage area, and consider how construction activities will influence those conditions over time. Only after understanding the site do they begin selecting a perimeter control.

Throughout this chapter, we learned that perimeter controls are not simply sediment barriers. They are water management tools designed to intercept runoff, reduce its energy, encourage sediment deposition, and minimize the amount of soil leaving a construction site. Their effectiveness depends not only on the product itself but also on how well that product matches the conditions it is expected to manage.

We also explored one of the most important principles in erosion and sediment control: preventing erosion is almost always more effective than capturing sediment after it begins moving. Stabilization, proper grading, runoff management, and perimeter controls should work together as a complete erosion and sediment control system rather than as individual solutions. No single BMP can solve every problem, but multiple practices working together can dramatically reduce erosion, sediment transport, and downstream impacts.

Perhaps the most important lesson from this chapter is that most BMP failures are not product failures. They are application failures. Products are often asked to perform outside their intended purpose, installed under the wrong conditions, or expected to compensate for problems that should have been addressed elsewhere in the erosion control plan.

As we move into the next chapter, the focus shifts from understanding perimeter controls to understanding how experienced erosion control professionals evaluate a site before selecting one. TerrainIQ follows this same philosophy by beginning with questions rather than products. Where is the runoff coming from? How is the water moving? What conditions exist? What is the BMP trying to accomplish? When those questions are answered first, the most appropriate solution often becomes clear.

Understanding the site before selecting the solution is one of the defining characteristics of successful erosion control professionals and one of the foundational principles upon which Terrain Civil University and TerrainIQ are built.

CHAPTER 2 - Site Evaluation and BMP Selection

Water, Slope, Drainage Area, and Site Conditions

Every construction site is different.

No two projects have the same topography, soil conditions, drainage patterns, slopes, rainfall characteristics, construction phasing, or regulatory requirements. Yet one mistake continues to appear on projects of every size - selecting a perimeter control before fully understanding the site it is intended to protect.

Experienced erosion control professionals approach this process differently. Before discussing products, they evaluate how water moves across the site. They identify drainage areas, observe existing and proposed flow paths, determine whether runoff exists as sheet flow or concentrated flow, evaluate slope length and steepness, and consider how construction activities will influence runoff throughout the life of the project. Only after these conditions are understood do they begin selecting a perimeter control.

This approach reflects one of the fundamental principles of erosion and sediment control. The effectiveness of a BMP depends far less on the product itself than on how well it matches the hydraulic conditions it is expected to manage. A straw wattle may perform exceptionally well on one project and fail completely on another. A silt fence may function exactly as intended in one location yet become overwhelmed only a few hundred feet away. In most cases, the difference is not the product.

The difference is the site.

Successful erosion control begins with observation rather than installation. It begins by asking questions before making decisions. Where is the runoff coming from? Where is it going? How much water will this BMP receive? What is changing as construction progresses? Answering these questions provides the foundation for selecting the right BMP and avoiding many of the failures discussed in the previous chapter.

This thought process forms the foundation of TerrainIQ and mirrors the approach used by experienced contractors, inspectors, engineers, and erosion control professionals every day. Throughout this chapter, we will examine the key site characteristics that influence perimeter control selection and develop a practical framework for evaluating erosion control challenges before a single product is installed.

2.1 First Principles of BMP Selection

Every successful erosion and sediment control plan begins long before the first perimeter control is installed. It begins with evaluating the site.

Although contractors, engineers, inspectors, developers, and distributors may each approach a project from a different perspective, they all begin by trying to answer the same fundamental question:
How is water going to behave on this site?

An engineer studies the site's topography, drainage areas, soil conditions, slopes, and proposed grading to determine how runoff will move after construction begins. Their objective is to design an erosion and sediment control system that manages runoff before it creates problems.

A municipal reviewer or stormwater inspector often approaches the site from a different perspective. They are asking whether the proposed BMPs have been selected appropriately, whether they have been installed according to the approved plans, and whether they are likely to perform under anticipated site conditions. During inspections, they are looking for signs that runoff is bypassing controls, that sediment is leaving the project, or that maintenance has been neglected.

Contractors and superintendents are often focused on constructability and execution. They must determine how perimeter controls can be installed efficiently while adapting to changing site conditions, construction sequencing, weather, equipment access, and project schedules. As grading progresses, they continually evaluate whether existing BMPs remain effective or need to be modified as drainage patterns change.

Estimators, distributors, and sales professionals should approach the site differently still. Rather than beginning with products, they should begin by understanding the problem the project is trying to solve. Before discussing silt fence, filter sock, or Erosion Eels, they should ask:
Where is the runoff coming from?
Where is it going?
How much water will this BMP receive?
How quickly is that water moving?
How much sediment is likely to be generated?
How long will the BMP remain in service?
Only after these questions have been answered should product selection begin.

Notice that regardless of the role, everyone starts in essentially the same place. They evaluate the water before evaluating the products.

This thought process forms the foundation of effective erosion and sediment control design and represents one of the core principles of TerrainIQ. The products may differ from project to project, but the process used to evaluate the site remains remarkably consistent. Understanding that process is often more valuable than memorizing individual BMPs because it allows you to adapt to virtually any project you encounter.

2.2 Understanding Sheet Flow

One of the first observations an experienced erosion control professional makes when arriving on a construction site is determining how water moves across the ground surface. Before evaluating products, they begin by asking a simple question:

"Is this sheet flow or concentrated flow?"
The answer to that question often determines the success or failure of the entire erosion and sediment control system.

Sheet flow occurs when stormwater moves broadly and relatively evenly across the ground surface without becoming channelized. Instead of flowing within a ditch or swale, runoff spreads across the disturbed area as a shallow, continuous layer of water. Because the flow remains relatively uniform, its depth is generally shallow, its velocity is comparatively low, and its ability to transport sediment is more predictable.

This type of runoff is commonly encountered across building pads, parking lot construction sites, utility corridors, open graded areas, and newly constructed slopes before water has an opportunity to collect into defined drainage paths.

An engineer evaluating sheet flow immediately begins thinking about drainage areas, slope length, runoff velocity, and where water will eventually begin to concentrate. Their objective is to interrupt runoff before it gains enough energy to create erosion problems.

A contractor or superintendent often views the same area differently. They are considering how grading operations will change throughout the project, how equipment traffic may alter runoff patterns, and whether today's sheet flow could become tomorrow's concentrated flow as construction progresses.

A municipal inspector is typically looking for something else. They want to verify that perimeter controls have been installed where sheet flow is actually expected. If runoff has already become concentrated before reaching the BMP, they immediately recognize that the selected product may no longer be appropriate for the conditions it is expected to manage.

An estimator or distributor should develop yet another perspective. Rather than simply counting rolls of silt fence or filter sock, they should ask whether the products shown on the plans are actually intended to manage sheet flow conditions. Understanding that relationship often explains why one project specifies traditional silt fence while another specifies advanced sediment barriers or weighted sediment tubes.

The reason sheet flow is so important is that many of the perimeter controls discussed throughout this module were specifically designed to manage these conditions. Silt fence, straw wattles, filter sock, sediment tubes, and numerous other BMPs perform exceptionally well when runoff remains shallow, broadly distributed, and relatively uniform. As long as water has not yet concentrated, these products can effectively reduce runoff velocity, encourage sediment deposition, and minimize off-site sediment transport.

One of the most valuable habits an erosion control professional can develop is learning to recognize sheet flow before selecting a perimeter control. Once runoff becomes concentrated, the rules begin to change dramatically. Understanding where that transition occurs is one of the most important skills in erosion and sediment control and forms the foundation for the next section of this chapter.

2.3 Understanding Concentrated Flow

If sheet flow represents the ideal condition for most perimeter controls, concentrated flow represents one of their greatest challenges.

As stormwater moves across a disturbed site, it naturally seeks the path of least resistance. Small depressions begin collecting additional runoff, shallow flow paths deepen, and individual sheets of water gradually merge together. What began as broad, shallow sheet flow eventually organizes itself into a defined channel. This transition is known as concentrated flow. Once runoff becomes concentrated, everything begins to change.

The depth of the water increases. Velocity increases. The amount of runoff being carried through a single location increases. Most importantly, the energy contained within the moving water increases dramatically. As that energy increases, so does the water's ability to detach soil particles, transport sediment, erode slopes, and damage downstream infrastructure.

Concentrated flow commonly develops within swales, temporary ditches, roadside channels, natural drainageways, low areas, and other locations where runoff has been allowed to collect into a defined path. These locations often become the most vulnerable portions of a construction site because they experience the greatest hydraulic forces during a rainfall event.

An engineer reviewing these conditions immediately begins evaluating hydraulic capacity. They recognize that once runoff becomes concentrated, traditional perimeter controls may no longer provide adequate protection. Instead, they begin considering ditch checks, slope interruption, armored channels, diversion practices, outlet protection, or other BMPs specifically designed to manage higher-energy flow conditions.

A contractor or superintendent often recognizes concentrated flow through experience. They know where water tends to collect after every storm, where erosion repeatedly develops, and which portions of the site require the greatest attention as grading operations continue. Construction activities frequently change drainage patterns, requiring perimeter controls to evolve as the project progresses.

Municipal inspectors frequently focus their attention on these same locations because they understand that concentrated flow is where BMP failures most often occur. They look for signs of undercutting, overtopping, channel erosion, sediment bypass, and evidence that runoff has exceeded the intended capacity of the installed BMP. In many cases, the issue is not that the product failed. The issue is that a product designed for sheet flow was expected to perform under concentrated flow conditions.

Estimators, distributors, and sales professionals should develop the same habit. When reviewing plans or visiting a project site, they should learn to identify where runoff is likely to concentrate rather than simply counting quantities of erosion control products. Doing so often explains why one portion of a project requires traditional silt fence while another specifies filter sock, Erosion Eels, ditch checks, or other specialized BMPs.

Perhaps the most important lesson is that concentrated flow rarely develops by accident. It is usually the predictable result of topography, grading, drainage patterns, and runoff accumulation. Learning to recognize where this transition will occur before construction begins is one of the most valuable skills an erosion control professional can develop.

Throughout the remainder of this module, remember this simple principle:
Most perimeter controls are designed to manage sheet flow. Very few are designed to manage concentrated flow.

Understanding where one becomes the other is one of the defining characteristics of experienced erosion control professionals and often determines whether a BMP succeeds or fails.

2.4 Understanding Drainage Area

Drainage area is the amount of land that contributes runoff to a specific location. In erosion and sediment control, this location may be a silt fence, filter sock, wattle, sediment tube, ditch check, inlet protection device, or any other BMP intended to receive and manage stormwater runoff.

The size of the drainage area directly influences how much water reaches the BMP during a rainfall event. A small contributing area may produce shallow, manageable runoff that a standard perimeter control can handle effectively. A larger contributing area may produce significantly more runoff, higher velocity, greater sediment loading, and increased stress on the BMP.

This is one of the reasons perimeter controls cannot be evaluated by appearance alone. A section of silt fence may look identical in two different locations, but if one receives runoff from a small disturbed area and the other receives runoff from several acres, the performance expectations are completely different.

Engineers evaluate drainage area because it helps determine whether a BMP has enough capacity for the runoff it will receive. Contractors and superintendents should evaluate drainage area because field conditions often change as grading progresses. Inspectors evaluate drainage area because many BMP failures occur when runoff from too large an area is directed toward a control measure that was never intended to manage that volume of water.

A perimeter control that performs well with one-quarter acre of contributing drainage may fail completely when subjected to several acres of runoff. The product may not be defective. The installation may even be acceptable. The problem is that the BMP is being asked to manage more water and sediment than it was designed to handle. Drainage area should always be evaluated before product selection. If the contributing area is small and runoff remains shallow, a traditional perimeter control may be appropriate. If the drainage area is large, flow begins to concentrate, or sediment loading is expected to be significant, a stronger or more specialized BMP may be required.

Understanding drainage area helps explain why the same product can succeed in one location and fail in another. The difference is often not the BMP itself. The difference is how much water is being delivered to it.

2.5 Understanding Slope Length

Slope length is one of the most overlooked factors in perimeter control selection.

As runoff travels downslope, it gains volume and velocity. The farther water travels across disturbed soil, the more energy it collects and the greater its ability becomes to detach and transport sediment. A short slope may produce shallow, manageable runoff. A long slope can generate enough velocity and sediment loading to overwhelm a BMP placed only at the bottom.

This is why engineers evaluate slope length when developing erosion and sediment control plans. They understand that erosion problems often begin before runoff ever reaches the perimeter of the site. If water is allowed to travel too far without interruption, it may gain enough energy to create rills, gullies, concentrated flow paths, or heavy sediment loading.

Contractors and superintendents often see this issue in the field after rainfall events. Long slopes begin to show visible flow paths, washed areas, sediment deposits, and damaged BMPs at the bottom of the slope. Inspectors look for the same warning signs because they indicate that runoff may need to be interrupted higher on the slope rather than controlled only at the perimeter.

For this reason, long slopes often require multiple BMPs instead of a single perimeter control at the bottom. Wattles, filter sock, Erosion Eels, coir logs, and other slope interruption devices can be installed at intervals to reduce runoff energy before it becomes a larger problem.

The principle is simple: the longer the slope, the more important it becomes to manage water before it gains momentum.

2.6 Slope Interruption

Slope interruption is one of the most important concepts in erosion control because it addresses runoff before it reaches the bottom of the slope.

Rather than allowing water to travel uninterrupted across the full slope length, BMPs are installed at intervals to break the slope into smaller, more manageable segments. Each interruption slows the runoff, reduces its energy, and creates an opportunity for sediment to settle before the water continues downslope.

This approach is important because erosion often becomes worse as water gains momentum. A single perimeter control at the base of a long slope may be forced to manage all the accumulated runoff and sediment from above. By that point, the water may already have enough energy to overwhelm the BMP, cut around it, or carry sediment beyond the intended control area.

Engineers use slope interruption to reduce the effective slope length and limit the amount of runoff reaching any one location. Contractors use it to prevent recurring washouts and reduce maintenance at the bottom of slopes. Inspectors look for it when long disturbed areas show rilling, sediment movement, or evidence that perimeter controls are being overloaded.

Common slope interruption products include straw wattles, filter sock, Erosion Eels, coir logs, and other sediment tube systems. The appropriate product depends on slope steepness, soil conditions, runoff volume, project duration, and maintenance expectations.

In many cases, slope interruption provides better performance than relying solely on a perimeter control at the base of the slope. The goal is simple: slow the water early, reduce sediment movement, and prevent a small erosion problem from becoming a larger failure downstream.

2.7 Understanding BMP Capacity

Every BMP has a capacity limit.

A perimeter control may be properly selected, properly installed, and properly located, but it can still fail if it receives more water or sediment than it was designed to manage. Capacity is influenced by drainage area, runoff volume, sediment loading, installation quality, and maintenance frequency. When any of these factors exceed the practical limits of the BMP, performance begins to decline.
This is one reason engineers evaluate contributing drainage area and anticipated flow conditions before selecting control measures. They are not simply choosing products. They are estimating whether the BMP can reasonably manage the conditions it will receive.

Contractors and superintendents often see capacity problems after storm events. Sediment builds up behind the BMP, water begins ponding higher than expected, or runoff starts cutting around the ends. Inspectors look for these same warning signs because they indicate that the BMP may be overloaded, poorly maintained, or improperly matched to the site conditions.

Common signs of exceeded capacity include overtopping, undercutting, blowouts, excessive sediment accumulation, and visible bypass around the control. These problems usually indicate that the BMP is being asked to manage too much runoff, too much sediment, or too much energy.

Understanding BMP capacity helps prevent these failures. The goal is not simply to install a perimeter control, but to install one that can reasonably manage the site conditions it will encounter throughout construction.

2.8 Selecting the Appropriate BMP

Successful BMP selection requires balancing several site, design, construction, and maintenance factors. No single perimeter control is appropriate for every condition, and no product should be selected simply because it is familiar or readily available.

The first consideration is always hydraulic condition. If runoff is moving as shallow sheet flow, traditional perimeter controls may perform well. If runoff has become concentrated, the BMP must be capable of handling greater depth, velocity, and energy.

Drainage area also matters. A small contributing area may require only a basic sediment barrier, while a larger drainage area may require a stronger system, slope interruption, diversion, or multiple BMPs working together. Slope characteristics influence selection as well. Long or steep slopes often require water to be slowed before it reaches the perimeter. In those cases, wattles, filter sock, Erosion Eels, or other slope interruption products may be more important than the final perimeter control at the base of the slope.

Installation and maintenance should also be considered. A product that performs well on paper may not be practical if the site lacks access, labor is limited, or maintenance will be inconsistent. Inspectors often evaluate not only whether a BMP was installed, but whether it can realistically be maintained throughout construction.

Finally, project specifications must be respected. A private commercial project, municipal site, and TDOT project may each require different materials, installation methods, or performance standards. The appropriate BMP must satisfy both the site conditions and the governing specification.

When these factors are evaluated together, BMP selection becomes less about preference and more about problem solving. The best choice is the product or combination of products that can reasonably manage the water, sediment, slope, specification, and maintenance realities of the project.

Chapter Summary

Most perimeter control discussions begin with products. Experienced erosion control professionals begin with water.

Before discussing silt fence, filter sock, wattles, Erosion Eels, or any other BMP, the first step is understanding how runoff behaves on the site. Where is the water coming from? Where is it going? Is it moving as sheet flow or concentrated flow? How much drainage area contributes to the location being evaluated? How long is the slope? How much sediment is likely to be generated? These questions should guide the selection process before any product decision is made.

Throughout this chapter, we learned that site evaluation is the foundation of effective BMP selection. Sheet flow and concentrated flow require different solutions because they place very different demands on perimeter controls. A product that performs well under shallow, evenly distributed runoff may fail quickly when exposed to channelized flow, higher velocity, or excessive sediment loading. Understanding this distinction is one of the most important skills in erosion and sediment control.

Drainage area and slope length also play a major role in BMP performance. Larger drainage areas generally produce more runoff and more sediment. Longer slopes allow water to gain speed and energy before it reaches the perimeter of the site. For this reason, slope interruption is often more effective than relying only on a single BMP at the bottom of a disturbed slope. Slowing water early can reduce sediment transport, protect downstream controls, and prevent small erosion problems from becoming larger failures.

Every BMP also has a practical capacity limit. When a control measure receives more runoff, sediment, or hydraulic energy than it was designed to manage, failure becomes more likely. Overtopping, undercutting, blowouts, excessive sediment accumulation, and bypass flow are often signs that the BMP is overloaded, poorly maintained, or improperly matched to the site conditions.

The TerrainIQ approach mirrors the logic used by experienced erosion control professionals. First, identify whether runoff is sheet flow or concentrated flow. Then evaluate drainage area, slope length, sediment loading, maintenance expectations, installation requirements, and applicable project specifications. Only after those conditions are understood should the BMP be selected.

The most important lesson from this chapter is that the site almost always tells you which solution is appropriate. Successful BMP selection is not about choosing the most familiar product. It is about understanding the water, understanding the sediment, understanding the slope, and selecting the control measure that best matches the conditions.

CHAPTER 3 - Traditional Silt Fence Systems

Commercial, TDOT, and Wire Backed Silt Fence

Few erosion control products are more widely recognized than silt fence.

From residential subdivisions and commercial developments to utility installations and major highway projects, silt fence has become one of the most common perimeter control BMPs used throughout the construction industry. Its popularity comes from a relatively simple idea: intercept shallow runoff, slow the movement of water, and allow sediment to settle before runoff leaves the disturbed area.

Because silt fence is so common, it is often treated as a universal solution. That is one of the reasons it is also one of the most misunderstood BMPs in erosion control. Many failures occur because silt fence is expected to perform functions it was never designed to perform. It is frequently installed where runoff has already become concentrated, where drainage areas are too large, where slopes are too long, or where the system is never properly maintained after installation.

From an engineering perspective, silt fence is not simply a line drawn around the edge of a project. It is a temporary sediment barrier intended for specific hydraulic conditions. It performs best where runoff remains shallow, distributed, and slow enough for temporary ponding and sediment deposition to occur. When those conditions are ignored, the fence may fail even if the product itself is acceptable.

Contractors often experience this difference in the field. One section of silt fence may perform well for months, while another section fails after the first significant storm. The difference is rarely random. It usually reflects a difference in drainage area, slope, flow concentration, installation quality, or maintenance. Inspectors look for these same clues when determining whether the BMP is functioning as intended or whether the site conditions have exceeded its practical limits.

Understanding silt fence requires more than knowing fabric weight, post size, or roll length. Those details matter, but they only tell part of the story. To use silt fence effectively, the professional must understand where it works, where it does not work, and why matching the product to the site conditions is more important than simply installing it because it appears on a plan.

This chapter examines traditional silt fence systems, including commercial silt fence, TDOT silt fence, wire-backed systems, fabric weight, post spacing, installation methods, and common failure modes. The goal is not simply to describe silt fence as a product. The goal is to understand how it functions as part of a larger erosion and sediment control strategy.

3.1 Silt Fence Fundamentals

Silt fence is a temporary sediment barrier made from geotextile fabric supported by posts and installed along the contour of the land. Its purpose is to intercept shallow sheet flow, slow the movement of runoff, and create conditions that allow sediment to settle before water leaves the disturbed area.

One of the most common misunderstandings about silt fence is believing that it functions like a dam. It does not. Silt fence is not intended to stop large volumes of water or hold back concentrated flow. When it is used that way, failure becomes likely. The fence may overtop, undercut, collapse, or allow runoff to bypass around the ends.
The primary function of silt fence is not filtration alone. While some water may pass through the geotextile fabric, much of the sediment removal occurs because runoff slows down behind the fence. As velocity decreases, heavier soil particles fall out of suspension and remain on-site. This process is called sediment deposition, and it is one of the most important principles behind silt fence performance.

From an engineering perspective, silt fence is most effective when it is used under controlled hydraulic conditions. The contributing drainage area should be limited, the runoff should remain shallow and distributed, and the fence should be installed along the contour, so water reaches the system evenly rather than concentrating at a low point.

In the field, contractors and inspectors often recognize poor silt fence applications quickly. If water is cutting beneath the fence, flowing around the ends, ponding too deeply, or pushing the fabric over, the issue is usually not that silt fence does not work. The issue is that the fence is being asked to perform outside its intended purpose.

This distinction helps explain why silt fence can perform well in one location and fail in another. When installed properly in sheet flow conditions with manageable drainage area, it can be an effective and economical sediment control BMP. When placed in concentrated flow, overloaded by excessive runoff, or left unmaintained, it becomes one of the most visible failure points on a construction site.

3.2 The Evolution of Silt Fence

Early silt fence installations were often built entirely in the field. Contractors purchased geotextile fabric, wire mesh, steel posts, and fasteners as separate components, then assembled the system on-site. When properly installed, these systems could be effective, especially in more demanding applications. However, they required significant labor, careful installation, and a higher level of field consistency than many projects could reliably provide.

As erosion control requirements became more common across residential, commercial, municipal, and transportation projects, the industry began looking for ways to make silt fence installation faster and more consistent. Prefabricated systems became the answer. Instead of assembling the fence piece by piece in the field, manufacturers began attaching geotextile fabric directly to wooden posts before delivery to the project site.

This change had a major impact on everyday construction practice. Prefabricated silt fence allowed contractors to install longer runs more quickly, reduce field labor, and achieve more consistent spacing between posts. For commercial sitework contractors, this improvement mattered because silt fence is often installed early in the project, before grading, utilities, paving, landscaping, or vertical construction can proceed efficiently.

From an inspector's perspective, prefabricated systems also made installations easier to evaluate. Post spacing, fabric attachment, and overall product configuration became more predictable. The quality of the installation still depended on trenching, alignment, terminations, and maintenance, but the manufactured portion of the system became more uniform.

Today, prefabricated silt fence dominates the commercial construction market because it provides a practical balance of cost, speed, and familiarity. Field-built wire-backed systems still have their place, especially where specifications require additional structural support, but most standard commercial applications rely on prefabricated fence because it can be installed efficiently and performs well when matched to the proper site conditions.

3.3 Commercial Silt Fence

Commercial silt fence is the most common perimeter control system used on private development projects throughout Middle Tennessee. It is widely used on residential subdivisions, commercial sites, utility work, small grading projects, and general site development because it provides a practical balance of cost, availability, and installation speed.

Terrain Civil's standard commercial silt fence is a prefabricated system consisting of 70 gram geotextile fabric attached to 1.25-inch hardwood posts. It is typically supplied in 100-foot rolls and is available with either 6-foot or 10-foot post spacing, depending on project requirements and expected site conditions.

The system is designed primarily for sheet flow applications. When runoff remains shallow, distributed, and manageable, commercial silt fence can intercept water, slow its velocity, and encourage sediment to settle before runoff leaves the disturbed area. This makes it a useful and economical choice for many private development projects.

From a contractor's perspective, commercial fence is attractive because it is familiar, readily available, relatively inexpensive, and fast to install. Crews understand how to work with it, inspectors are accustomed to seeing it, and most sitework contractors keep it in regular use.

From an engineering or inspection perspective, the key question is not whether commercial silt fence is acceptable in general. The key question is whether it is appropriate for the specific location where it is being installed. If the contributing drainage area is limited, the flow remains shallow, and the installation follows the contour with proper embedment and terminations, commercial fence can perform very well.

However, commercial silt fence should not be expected to manage large drainage areas, concentrated flow, steep uncontrolled slopes, or excessive sediment loading. When used within its intended design limits, it remains one of the most practical and cost-effective BMPs in the erosion control toolbox.

3.4 Understanding Post Spacing

One of the most overlooked variables in silt fence performance is post spacing.

To many people, silt fence is simply silt fence. However, the distance between posts has a direct impact on how the system performs under load. Post spacing influences how much support the fabric receives, how much the fence deflects when runoff ponds behind it, and how well the system resists sediment and hydraulic pressure during storm events.

Commercial silt fence is commonly available with either 6-foot or 10-foot post spacing. Six-foot spacing provides greater support, reduces fabric deflection, and generally improves performance where heavier sediment loading or greater runoff pressure is expected. Ten-foot spacing can reduce material cost, speed up installation, and work well in lighter-duty applications where runoff remains shallow and drainage area is limited.

From an engineering or inspection perspective, closer post spacing increases the structural reliability of the system. From a contractor's perspective, wider spacing may reduce cost and improve installation speed. The correct choice depends on balancing performance expectations with site conditions and project requirements. As runoff volume, sediment loading, slope length, or duration of service increases, closer post spacing generally becomes more important. A fence with wider spacing may be acceptable in light sheet flow conditions, but it should not be expected to perform the same way under heavier loading.

Post spacing is a small detail that can make a significant difference. Like many erosion control decisions, it should be selected based on the conditions the fence will actually encounter, not simply on lowest material cost.

3.5 TDOT Silt Fence

Transportation projects often require more robust perimeter controls than those commonly used on private development sites. Roadway projects, highway improvements, bridge work, utility relocations, and other infrastructure projects may involve larger drainage areas, longer project durations, greater public exposure, and more demanding inspection requirements.

TDOT silt fence is designed to meet those higher expectations.

Compared to standard commercial fence, TDOT silt fence generally uses heavier materials and closer spacing. A typical TDOT silt fence system consists of 100 gram geotextile fabric attached to 1.75-inch hardwood posts installed at 6-foot spacing. The heavier fabric provides improved durability, while the larger posts and closer spacing increase resistance to loading from runoff and sediment accumulation.

From an engineering perspective, these material differences reflect the conditions often found on transportation projects. Roadway work frequently involves long disturbed slopes, roadside ditches, embankments, concentrated drainage patterns, and extended construction schedules. These conditions place greater demands on erosion control systems than many smaller commercial or residential projects.

From a contractor's perspective, TDOT fence costs more and requires more effort to install than commercial fence, but it also provides a stronger and more durable system. On projects governed by TDOT standards, the choice is not simply a preference. The specification determines the required product.

Inspectors evaluate TDOT silt fence with those same expectations in mind. They are looking for proper fabric, post size, post spacing, installation alignment, embedment, terminations, and maintenance. A heavier fence system still cannot overcome poor installation or improper application, but when installed correctly and used under appropriate conditions, TDOT silt fence provides a meaningful step up in strength and performance.

The important lesson is that TDOT fence is not just a heavier version of commercial fence. It represents a higher-performance system intended for projects where the consequences of failure, the duration of exposure, and the demands placed on the BMP are often greater.

3.6 Understanding Fabric Weight

Fabric weight is often used as a quick indicator of relative strength, durability, and expected performance in silt fence systems.

In general, 70 gram fabric is commonly used for commercial and residential applications where runoff remains shallow, drainage areas are limited, and the fence is being used under typical sheet flow conditions. It provides a practical balance of cost, availability, and performance for many private development projects.
A 100 gram fabric provides a step up in strength and durability. It is commonly associated with TDOT fence, wire-backed fence, and other applications where greater sediment loading, longer project duration, or more demanding site conditions are expected.

However, fabric weight should not be viewed as the only measure of performance. A heavier fabric does not automatically make a poor application successful. If the fence is installed in concentrated flow, subjected to too much drainage area, poorly trenched, improperly terminated, or left unmaintained, even a heavier fabric can fail.

From an engineering and inspection perspective, fabric weight is only one part of the overall system. Post size, post spacing, embedment, alignment, site conditions, sediment loading, and maintenance all matter. From a contractor's perspective, the correct fabric should match both the specification and the conditions the fence will encounter in the field.

The important lesson is that stronger material can improve performance, but it cannot overcome poor application. Fabric weight matters, but the site still determines whether the BMP is being used correctly.

3.7 Proper Silt Fence Installation

Proper silt fence installation is not complicated, but it does require care, discipline, and an understanding of how water behaves.

If you are learning this trade, one of the first things to understand is that silt fence does not usually fail because the fabric is bad or the posts are weak. Most failures happen because someone installed the fence without thinking through what the water would do during the next rain event. A few shortcuts during installation can create hours of repair later.

The first rule is to install silt fence along the contour of the land whenever possible. Silt fence should generally run across the slope, not straight downhill. If the fence is installed downhill, it can collect and concentrate runoff along the fence line. Once that happens, the fence is no longer slowing water. It may actually be helping create the very erosion problem it was intended to prevent.

The second rule is continuous ground contact. The bottom of the fabric must stay tight to the soil. Water always finds the easiest path. If there is a gap beneath the fence, runoff will find that gap, begin cutting under the fabric, and carrying sediment through the weak point. From a distance, the fence may still look acceptable, but it is no longer functioning properly.

That is why trenching or keying the fabric into the ground matters. One of the most common mistakes is setting silt fence directly on top of the ground and assuming the posts will hold it in place. The posts support the fence, but the trench helps prevent undercutting. Without proper embedment, runoff can pass beneath the system and transport sediment off-site even when the fence appears upright.

A good installer also pays close attention to low spots. Low areas collect water. If a fence crosses a low point where runoff naturally concentrates, that section will receive more flow and pressure than the rest of the line. In some cases, the layout may need to change. In other cases, a stronger BMP, additional reinforcement, a J-hook, an outlet, or a different sediment control system may be needed.

Terminations are another detail that should never be treated casually. Many silt fence failures occur at the ends of the run. If runoff can flow around the last post, it will bypass the system entirely. A proper return or J-hook turns the end of the fence uphill and gives runoff a place to slow, pond, and drop sediment before leaving the protected area. The purpose of a J-hook is not appearance. It is a water management detail.

Concentrated flow requires special attention. Standard silt fence is designed primarily for sheet flow, not for ditches, swales, channels, or low points carrying concentrated runoff. If concentrated flow reaches a fence, overtopping, undercutting, blowouts, or collapse can occur quickly. In certain situations, a designed silt fence outlet may be used to provide a controlled release point and reduce uncontrolled overtopping. Products such as SiltSaver outlet systems can help manage temporary ponding and discharge, but they do not make every concentrated flow condition appropriate for silt fence. The better question is always whether silt fence is the correct BMP for that location in the first place.

The best installers do more than place fabric and posts in the ground. They read the site. They look at the slope, the low points, the drainage area, the soil, and the likely flow path. They ask where the water will go when it rains and what the fence will be asked to do when that water arrives.

That habit separates someone who can install silt fence from someone who understands erosion control.

3.8 Connecting Silt Fence Rolls

One of the details that separates a clean silt fence installation from a weak one is how two rolls are connected. Prefabricated silt fence is commonly supplied in 100-foot rolls. On most projects, multiple rolls must be connected to create a continuous perimeter control. The transition between rolls is often a weak point if it is not handled correctly.

A common field method is to overlap the end posts of the two rolls and roll the last post of each section around the other. This creates a stronger connection than simply butting two sections together or loosely fastening the fabric. By wrapping the end posts together, the installer creates continuity between the two fence sections and reduces the chance that runoff will separate the joint during a storm event.

This connection matters because water will find the weakest point in the system. If there is a gap between rolls, runoff can bypass the fence, carry sediment through the opening, and undermine the performance of the entire installation. From a distance, the fence may look complete, but during a rainfall event, that weak transition can become the failure point.

Good installers treat every roll connection as part of the BMP. The fence should function as one continuous system, not as a series of disconnected sections placed beside one another.

3.9 Common Silt Fence Failures

Most silt fence failures result from improper application, improper installation, or lack of maintenance rather than product defects. The fence may be made from acceptable materials and still fail if it is placed in the wrong location, installed incorrectly, or expected to manage conditions beyond its design limits.

One of the most common failures is undercutting. This occurs when runoff flows beneath the fence instead of being slowed by it. Undercutting usually indicates poor trenching, poor ground contact, inadequate embedment, or erosion that has developed along the bottom of the fabric. Once water begins cutting under the fence, the problem often grows quickly.

Overtopping occurs when water ponds behind the fence and rises above the fabric. This usually means the fence is receiving too much runoff, too much sediment, or flow that has become concentrated. Once overtopping begins, the fence may collapse, release sediment downstream, or create erosion along the overflow path.

Blowouts occur when excessive loading causes the system to rupture, separate, or structurally fail. This may happen when sediment accumulates beyond the fence's capacity, when post spacing is too wide for the conditions, when fabric is overstressed, or when the fence is subjected to concentrated flow it was not designed to handle.

Improper terminations are another common failure point. If the ends of the fence are not returned uphill, tied into a stable feature, or shaped with a J-hook where appropriate, runoff can simply flow around the end of the system. In that situation, the fence may appear complete but still fail to control sediment because water has bypassed the protected area.

Concentrated flow is one of the most serious causes of silt fence failure. Standard silt fence is designed primarily for shallow sheet flow. When it is installed across a swale, ditch, drainage channel, low point, or other concentrated flow path, it is often being asked to perform outside its intended purpose. In those locations, a different BMP or an engineered outlet condition may be required.

Understanding these failure modes helps prevent recurring installation mistakes. When silt fence fails, the first question should not be, "What is wrong with the fence?" The better question is, "What condition was this fence being asked to manage?"

Chapter Summary

One of the most common misconceptions in erosion control is believing that all silt fence is the same. In reality, commercial silt fence, TDOT silt fence, wire-backed systems, and advanced sediment barriers each occupy different positions on the performance spectrum. They may serve a similar general purpose, but they are not designed for identical project conditions.

Throughout this chapter, we learned that silt fence is intended primarily for shallow sheet flow. Its purpose is not to dam water, but to intercept runoff, reduce velocity, create temporary ponding, and encourage sediment to settle before runoff leaves the disturbed area. This distinction is important because many silt fence failures occur when the product is expected to manage concentrated flow, excessive drainage area, heavy sediment loading, or poor grading conditions.

We also examined how material selection influences performance. Commercial silt fence using 70 gram fabric and smaller posts may be well suited for many residential, commercial, and utility applications. TDOT silt fence, with heavier 100 gram fabric, larger posts, and closer spacing, provides a stronger system for transportation and infrastructure projects where performance expectations are higher. Post spacing, fabric weight, installation method, and specification requirements all influence how the system performs in the field.

Proper installation remains one of the most important factors in silt fence performance. A fence should follow the contour of the land, maintain continuous ground contact, be properly trenched or keyed into the soil, include strong roll-to-roll connections, and use proper terminations such as returns or J-hooks where needed. These details may seem small, but they often determine whether the fence functions as one continuous system or fails at its weakest point.

The most important lesson from this chapter is that the least expensive fence is not always the most economical fence. If a lower-cost system leads to repeated maintenance, repairs, sediment loss, or inspection problems, the true cost can quickly exceed the initial savings. The appropriate silt fence system should be selected based on project specification, drainage area, sediment loading, slope conditions, installation quality, and expected maintenance demands.

Silt fence remains one of the most common and useful BMPs in the erosion control industry, but only when it is used correctly. When the site conditions match the product's intended purpose and the installation details are respected, silt fence can be an effective and economical perimeter control. When those conditions are ignored, it quickly becomes one of the most visible failure points on a construction site.

CHAPTER 4 - Advanced Silt Fence Systems

Higher Performance Sediment Barrier Technologies

For decades, traditional silt fence served as the construction industry's primary perimeter control solution. It was familiar, widely available, relatively inexpensive, and effective when installed properly under the right site conditions. For many projects, traditional silt fence remains a practical and appropriate BMP.

However, as construction projects have become larger, schedules have become tighter, and regulatory expectations have increased, the limitations of traditional systems have become more apparent. Standard silt fence can be labor intensive to install correctly. Wire-backed systems may require separate fabric, wire, posts, and field assembly. Long runs of fence require careful connections, proper trenching, consistent terminations, and ongoing maintenance. On larger or more demanding projects, these requirements can become a major field challenge.

Contractors often feel this pressure first. They must install perimeter controls quickly, maintain them after storm events, repair failures, and keep the project moving. Inspectors see the same issue from a different angle. They are looking for systems that are properly installed, structurally stable, maintained, and capable of managing the conditions shown on the approved erosion control plan. Engineers and designers must consider whether the specified system can realistically perform under the expected runoff, sediment loading, project duration, and construction sequencing.

As these challenges increased, manufacturers began developing alternative systems intended to improve installation efficiency, increase structural capacity, reduce maintenance demands, and provide more consistent field performance. Some of these systems were designed to replace traditional wire-backed fence. Others were developed to provide controlled overflow, reinforced sediment containment, or higher-performance solutions for more demanding applications.
The result is a category of products commonly referred to as advanced silt fence systems. These systems do not eliminate the need for proper site evaluation, installation, or maintenance. They are not shortcuts around good erosion control practice. Instead, they are specialized tools designed to address some of the labor, performance, and reliability challenges associated with traditional silt fence.

This chapter examines why advanced systems were developed, where they fit within the erosion control toolbox, and how products such as wire-backed fence, controlled outlet systems, SmartFence, Silt Saver systems, and other high-performance sediment barriers compare to traditional silt fence applications.

4.1 Why Advanced Systems Were Developed

Advanced silt fence systems were not developed because traditional silt fence stopped working. Traditional systems still perform well when they are properly selected, properly installed, and used within their intended limits. Advanced systems developed because construction conditions changed.

Projects became larger. Schedules became tighter. Labor became harder to find. Inspection expectations increased. Contractors needed systems that could be installed faster, perform more consistently, and reduce the amount of repair work required after storm events.

Labor availability is one of the biggest drivers. Traditional wire-backed systems often require multiple components to be assembled in the field, including fabric, wire, posts, and fasteners. That work takes time and depends on skilled crews installing the system correctly. When labor is limited, products that reduce field assembly become more attractive.

Installation speed matters as well. On many projects, erosion control must be installed before grading or site disturbance can proceed. A system that installs faster can help keep the project moving while still satisfying regulatory and specification requirements.

Performance expectations have also increased. Engineers, municipal reviewers, TDOT inspectors, and environmental agencies are often looking for systems that provide greater structural support, more consistent installation quality, and better reliability under demanding site conditions. When runoff volume, sediment loading, or project duration increases, standard systems may no longer provide the best fit.

Maintenance is another major consideration. A lower-cost system that requires frequent repair may become expensive over the life of a project. Contractors increasingly look for systems that reduce maintenance frequency, resist damage, and remain functional after repeated storm events.

Safety and efficiency also play a role. Reducing field assembly can reduce the amount of time workers spend installing components along slopes, roadways, active construction areas, or difficult terrain. A system that is easier to install can also reduce exposure and improve consistency.

Advanced systems were developed to address these realities. They are not intended to replace good judgment, proper installation, or routine maintenance. Their purpose is to provide better options when traditional systems are too labor intensive, too inconsistent, or not strong enough for the conditions expected on the project.

4.2 Traditional Wire-Back Silt Fence

Historically, wire-backed silt fence represented the industry's solution when standard silt fence was not strong enough for the expected site conditions.

Traditional wire-backed systems generally consisted of geotextile fabric, wire mesh reinforcement, steel T-posts, and field-installed fasteners. The wire provided additional structural support behind the fabric, while the T-posts gave the system greater resistance to loading than wood-post commercial fence.

The purpose of wire backing was simple: increase strength. When runoff ponds behind the fence or sediment begins to accumulate, the fabric experiences pressure. Without reinforcement, the fabric can stretch, tear, or pull away from the posts. Wire backing helps distribute that load across the system and improves resistance to blowouts and fabric failure.

From an engineering perspective, wire-backed fence was often viewed as a step up in performance for more demanding applications. From a contractor's perspective, however, the system required more labor and more attention to detail. Fabric, wire, posts, and fasteners often had to be assembled in the field. That meant more components to handle, more installation time, and more opportunities for inconsistent workmanship.

Inspectors also had more to evaluate. They had to look at post spacing, wire placement, fabric attachment, trenching, terminations, and whether the system had been installed according to the required specification. A wire-backed fence could provide improved performance, but only if all components were installed correctly.

This labor and consistency challenge is one of the main reasons alternative technologies were developed. The industry needed systems that could provide higher structural performance without requiring as much field assembly. Traditional wire-backed fence remains an important part of erosion control history and is still used where specified, but many projects now look to prefabricated or advanced systems when labor efficiency and installation consistency are priorities.

4.3 Commercial Wire-Back Systems

Commercial wire-back silt fence was developed to reduce some of the labor associated with traditional field-built wire-backed systems.

Instead of requiring contractors to install separate fabric and wire mesh in the field, commercial wire-back products arrive with lighter wire reinforcement already attached to the fabric. These products are typically supplied in rolls using heavier fabric, often around 100 gram, with integrated wire support. Steel T-posts are still installed separately and used to support the system.

This approach creates a practical middle ground. Commercial wire-back fence provides more structural support than standard commercial silt fence while requiring less field assembly than traditional wire-backed systems. For contractors, that means faster installation and fewer separate components to manage. For inspectors, it creates a more consistent manufactured product while still requiring proper post spacing, fastening, trenching, terminations, and maintenance.

Commercial wire-back systems are often useful where a project needs more support than standard silt fence but does not justify a fully advanced sediment barrier system. They can provide improved resistance to loading, better fabric support, and stronger performance in more demanding sheet flow applications.

However, commercial wire-back fence should still be treated as a silt fence system. It does not turn a sheet flow BMP into a ditch check, and it should not be expected to manage large, concentrated flow conditions simply because wire reinforcement is present. The wire improves structural support, but the site conditions still determine whether the product is appropriate.

When used correctly, commercial wire-back systems remain an effective intermediate option between standard commercial silt fence and higher-performance advanced sediment barrier technologies.

4.4 Silt Fence Outlets and Controlled Release Points

One of the most important lessons in silt fence design is that water must eventually go somewhere.
Traditional silt fence is designed to intercept shallow sheet flow, slow runoff, and allow sediment to settle. Under normal conditions, water may pass through the fabric or release gradually around properly designed sections of the system. However, when runoff volume increases, sediment accumulates, or temporary ponding develops behind the fence, uncontrolled overtopping can become a serious failure risk.

This is where controlled release points become important.

A silt fence outlet is designed to provide a specific, intentional discharge location within a sediment barrier system. Rather than allowing water to overtop randomly, cut around the ends, or blow out the weakest section of fence, the outlet gives the system a controlled location where excess water can release while sediment remains upstream. SiltSaver has become one of the more recognized names associated with this type of thinking because the company focuses heavily on performance-based sediment control, structural integrity, controlled stormwater release, and sediment retention. SiltSaver's product line includes silt fence and barrier fence systems, Belted Silt Retention Fence products, frame and filter assemblies, inlet protection systems, ditch checks, slope drain bags, and replacement filters. Their broader product philosophy is built around solving real field problems with systems that improve reliability and reduce uncontrolled failure points.

In the field, the need for a controlled outlet usually becomes obvious after a rain event. Water ponds behind the fence, finds the lowest point, and begins spilling over the top. Once overtopping begins, the fence may collapse, tear, wash out at the base, or release stored sediment downstream. A controlled outlet system is intended to reduce that risk by creating a planned release point instead of allowing the fence to fail wherever it is weakest.

From an engineering perspective, the outlet concept recognizes that silt fence is not just a fabric barrier. It is a temporary sediment containment system. If the system is expected to impound runoff, even temporarily, there must be a reasonable way for water to discharge without destroying the BMP.
From an inspector's perspective, a properly designed outlet can be the difference between controlled performance and visible failure. Inspectors are often less concerned that water has left the area and more concerned with how it left. Did it pass through a designed release point, or did it cut under the fence, overtop randomly, bypass around the end, or carry sediment off-site?

From a contractor's perspective, controlled release products can reduce repeated maintenance in problem areas. Instead of repairing the same overtopped fence after every storm, the contractor may be able to use a SiltSaver-style outlet, reinforced barrier, or other advanced sediment control system to manage the water more predictably.

This distinction matters. A silt fence outlet does not make every concentrated flow condition appropriate for silt fence. It does not turn a standard fence into a ditch check, culvert protection device, or sediment basin. If runoff has already become concentrated in a swale, ditch, channel, or defined drainage path, another BMP may still be more appropriate.

The purpose of a controlled release point is to improve performance where temporary ponding behind a sediment barrier is expected and where uncontrolled overtopping would otherwise create a failure. In that role, SiltSaver outlet systems and similar controlled-release technologies represent an important evolution in sediment barrier design.

The first question should always remain the same: is silt fence the correct BMP for this location? If the answer is yes, and temporary ponding or overflow is expected, then a controlled outlet may help the system function more predictably. If the answer is no, the better solution may be a ditch check, Erosion Eel, filter sock, diversion, sediment trap, inlet protection device, or another BMP designed for the actual flow condition.

4.5 SmartFence Systems

SmartFence represents one of the more significant advancements in reinforced silt fence technology because it was developed to address many of the installation and performance challenges associated with traditional wire-backed fence.

Traditional wire-backed systems use fabric, wire reinforcement, steel posts, and field-installed fasteners to create a stronger sediment barrier. While effective, those systems require more labor and can vary in quality depending on how carefully they are assembled in the field. SmartFence was designed to simplify that process by combining structural strength and sediment control performance into a more integrated system.

The key idea behind SmartFence is reinforcement without traditional metal backing. Rather than depending on separate wire or chain-link support, SmartFence uses a high-strength woven geotextile designed to resist stretching, sagging, tearing, and excessive deflection under load. This allows the system to provide structural performance similar to wire-backed fence while reducing the number of field-installed components.

From a contractor's perspective, the value is installation efficiency. Fewer components mean less handling, less assembly, and fewer opportunities for inconsistent installation. On larger commercial, municipal, and infrastructure projects, that can translate into meaningful labor savings and faster deployment.

SmartFence can also provide advantages at the end of the project. Traditional wire-backed fence can be difficult and time-consuming to remove because fabric, wire, posts, and fasteners may all need to be separated, pulled, handled, and disposed of. Advanced systems that reduce the number of separate components can simplify removal, reduce cleanup labor, and limit the amount of mixed material sent to landfills.

This matters because erosion control products are often judged only by the cost to install them. In reality, the true cost includes installation, maintenance, removal, disposal, and site cleanup. A system that installs faster, performs more consistently, and removes more cleanly may provide value throughout the full life of the project.

From an engineering or inspection perspective, the value is consistency. A reinforced geotextile system can provide a more predictable level of performance than a field-built system that depends heavily on separate wire placement and fastening. However, SmartFence still requires proper placement, embedment, post installation, terminations, and maintenance. Advanced fabric does not eliminate the need for good erosion control practice.

SmartFence is often considered where a project requires greater strength than standard commercial silt fence but where traditional wire-backed fence may be too labor intensive or inefficient. It can be especially attractive on larger projects where durability, installation speed, reduced field assembly, easier removal, and reduced waste are important considerations.

The important lesson is that SmartFence is not simply another version of standard silt fence. It represents an effort to solve a specific field problem: how to provide wire-back-level performance with less labor, fewer components, more consistent installation quality, and a cleaner end-of-project removal process.

4.6 Silt Saver Systems

Silt Saver systems were developed to address many of the same challenges that led the industry away from traditional field-built wire-backed silt fence.

Traditional wire-backed systems can be effective, but they require multiple components, significant installation labor, and more effort at the end of the project when the system must be removed. Fabric, wire backing, steel posts, ties, and fasteners can all become tangled, damaged, or difficult to separate. Once removed, much of that material often ends up as mixed construction waste.

Silt Saver's approach focuses on creating sediment barrier systems that improve field efficiency while maintaining or improving performance. Products such as Belted Silt Retention Fence and related Silt Saver sediment control systems are intended to provide stronger, more consistent alternatives to traditional wire-backed fence while reducing the amount of field assembly required.

From a contractor's perspective, the advantages are practical. Simplified installation means fewer components to manage, less time spent assembling systems in the field, and fewer opportunities for inconsistent workmanship. On larger projects, those labor savings can become significant.

From an inspection and performance perspective, Silt Saver systems are often attractive because they are designed to provide improved structural stability, better sediment containment, and greater consistency than traditional field-built systems. As with any BMP, proper placement, embedment, terminations, and maintenance remain essential, but the system itself is designed to reduce some of the variability associated with field assembly.

Another practical feature of many Silt Saver products is the use of high-visibility colors. While this does not replace proper staking, signage, survey control, or approved erosion control plans, it can improve field visibility and help crews, inspectors, and equipment operators recognize protected areas more easily. On active construction sites, visual clarity matters. A highly visible sediment barrier can help reinforce limits of disturbance, identify protected drainage areas, mark sensitive boundaries, and reduce accidental disturbance by equipment or foot traffic.
This visibility becomes especially valuable on larger sites, roadway projects, utility corridors, and projects with multiple subcontractors working in the same area. A BMP that is easier to see is often easier to protect, inspect, and maintain. In that sense, high-visibility coloring is not just a product appearance feature. It contributes to better site communication and cleaner field execution.

Silt Saver systems can also provide value at project closeout. Advanced sediment barrier systems that reduce separate components can be easier to remove, easier to handle, and less wasteful than traditional wire-backed fence. Less tangled wire, fewer loose fasteners, and fewer mixed materials can reduce removal labor and limit the amount of material sent to landfills.
This lifecycle view is important. Perimeter controls should not be evaluated only by their purchase price. The true cost of a sediment barrier includes installation, maintenance, repair, removal, disposal, and cleanup. A system that costs more on the front end may still be the better value if it installs faster, performs more reliably, requires less repair, and removes more cleanly at the end of the job.

Like SmartFence, Silt Saver systems are frequently selected when project schedules, labor availability, performance requirements, visibility needs, or waste reduction goals make traditional wire-backed systems less desirable. They represent an important shift in erosion control thinking: away from simply building stronger fence in the field and toward using integrated systems that improve performance, visibility, installation efficiency, and end-of-project removal across the full life of the project.

4.7 Comparing Traditional and Advanced Systems

Traditional and advanced silt fence systems should not be compared by material cost alone.

Standard commercial fence, TDOT fence, wire-backed fence, SmartFence, Silt Saver systems, and other advanced sediment barriers each have a place in the erosion control toolbox. The appropriate choice depends on site conditions, project requirements, installation labor, inspection expectations, maintenance demands, and removal requirements at the end of the job.

Traditional fence systems remain attractive because they are familiar, widely available, and often less expensive on the front end. Most contractors understand how to install them, most inspectors are used to seeing them, and supply is generally reliable. For many residential, commercial, and smaller sitework projects, traditional silt fence remains the most practical solution when the site conditions match the intended use.

The challenge is that traditional systems can require more labor, more careful installation, and more frequent maintenance. Field-built wire-backed systems may also introduce variability because performance depends heavily on how well fabric, wire, posts, fasteners, trenching, and terminations are assembled in the field. At project closeout, removal and disposal can also become more labor intensive, especially when wire, fabric, ties, and posts must be separated or handled as mixed waste.

Advanced systems generally offer a different value proposition. They are often selected because they install faster, reduce field assembly, provide more consistent structural performance, improve visibility, reduce maintenance demands, or simplify end-of-project removal. Products such as SmartFence and Silt Saver systems may cost more initially, but they can reduce labor, improve consistency, reduce repair frequency, and limit waste compared to traditional wire-backed systems.

From a contractor's perspective, the decision often comes down to time, labor, and risk. From an engineer's or inspector's perspective, the question is whether the selected system can reliably manage the site conditions and meet the project specification. From an owner's perspective, the best system is often the one that reduces delays, maintenance problems, compliance issues, and unnecessary cleanup.

The most important comparison is not traditional versus advanced. The better comparison is total project value. A lower-cost fence may be appropriate when conditions are simple and maintenance is manageable. A higher-performance system may be the better choice when the project is large, labor is limited, visibility matters, runoff conditions are demanding, or repeated repair would create greater cost than the upgraded system itself.

The appropriate system is the one that provides the best balance of cost, performance, labor efficiency, maintenance, compliance, removal, and site conditions.

4.8 Performance vs Cost

A common mistake in erosion control is evaluating perimeter controls only by the material price.

Material cost matters, but it is only one part of the total cost of a BMP. The real cost includes the product itself, the labor required to install it, the equipment needed to place it, the time required to maintain it, the repairs needed after storm events, the cost of removal, the amount of waste generated, and the compliance risk created if the system fails.

This becomes especially important when comparing traditional fence systems to advanced sediment barriers. A standard silt fence or field-built wire-backed fence may cost less at the point of purchase, but that does not always make it the least expensive option over the life of the project. If the system requires more labor to install, more repairs after storms, more maintenance inspections, and more effort to remove at closeout, the lower initial price may not represent the true project cost.

Advanced systems such as SmartFence, Silt Saver products, and other reinforced sediment barriers may carry a higher material cost, but they can provide value in other ways. Faster installation, reduced field assembly, improved structural consistency, better visibility, reduced maintenance frequency, easier removal, and less disposal waste can all influence the final cost of the BMP.

Contractors often understand this lesson through experience. A product that saves money on the purchase order can become expensive if crews must return repeatedly to repair failures. Inspectors may see the same issue from a compliance standpoint. A lower-cost system that cannot meet the site conditions may create sediment loss, corrective actions, failed inspections, or project delays.

The larger the project, the more important this calculation becomes. On a small site, the difference between two systems may be minor. On a large commercial, municipal, infrastructure, or transportation project, installation labor, maintenance, repair frequency, and closeout removal can become major cost drivers.

The better question is not, "Which product is cheapest?" The better question is, "Which system provides the best total value for the conditions on this project?"
That value includes cost, performance, labor efficiency, maintenance, durability, compliance, removal, disposal, and risk reduction.

4.9 Selecting the Appropriate Advanced System

The goal of advanced sediment barrier selection is not to choose the most advanced product available. The goal is to choose the system that best matches the conditions encountered on the project.

A stronger system is not automatically the right system. A higher-cost system is not automatically the wrong system. The correct choice depends on what the BMP is being asked to manage and how long it must perform.

Drainage area is one of the first considerations. If the contributing area is small and runoff remains shallow, a traditional fence system may be adequate. If the drainage area is larger, sediment loading is heavier, or temporary ponding is expected, a reinforced or advanced system may be justified.

Sediment loading also matters. Projects with highly disturbed soils, long slopes, large grading areas, or extended construction schedules may require systems with greater capacity and durability. In those conditions, the cost of repeated maintenance can quickly outweigh the savings from a lower-cost product.

Site access and labor availability should also influence the decision. If access is difficult, crews are limited, or installation must happen quickly, systems that reduce field assembly can provide significant value. This is especially true on larger commercial, municipal, utility, and transportation projects where long runs of fence must be installed and maintained.

Maintenance resources are another important factor. A system that requires frequent repair may not be practical if the contractor does not have the labor, schedule, or access needed to maintain it properly. In those cases, a more durable system may reduce risk and improve overall project performance.

Project specifications and regulatory expectations must also be respected. Some projects require specific products, post spacing, fabric strength, reinforcement, visibility, or installation details. A BMP may be attractive from a cost standpoint, but it still has to satisfy the approved plans, governing agency, and inspection requirements.

The best advanced system is the one that fits the project. Sometimes that may be SmartFence. Sometimes it may be a Silt Saver system, a commercial wire-back product, a controlled outlet condition, or a traditional system installed correctly. Selection should be based on site conditions, performance needs, labor realities, maintenance expectations, removal considerations, and compliance risk.

Advanced systems are tools, not shortcuts. They work best when selected for the right reason and installed with the same care and judgment required of any other erosion control BMP.

Chapter Summary

The erosion control industry continues moving toward systems that reduce labor, improve consistency, and provide better performance across the full life of a project.

Traditional silt fence and wire-backed systems remain effective when they are properly selected, properly installed, and used under the right conditions. However, they can also require significant labor, careful field assembly, frequent maintenance, and more effort during removal. On larger or more demanding projects, those hidden costs can become just as important as the initial material price.

Advanced systems developed in response to those challenges. Commercial wire-back fence provides an intermediate step between standard silt fence and higher-performance systems. SmartFence and Silt Saver systems offer improved structural performance, faster installation, reduced field assembly, better consistency, and in many cases easier removal with less material going to landfills. Silt Saver products also add field visibility benefits that can help with site delineation, limits of disturbance, inspection, and communication around active work areas.

One of the most important lessons from this chapter is that material cost alone rarely tells the full story. A lower-cost fence may be appropriate on a smaller project with simple sheet flow conditions and manageable maintenance requirements. On larger commercial, municipal, infrastructure, or transportation projects, however, labor, repair frequency, inspection risk, removal cost, disposal, and compliance concerns may justify a higher-performance system.

The better question is no longer simply, "Which fence should I install?" The better question is, "What level of performance does this project require, and how much labor, maintenance, and risk am I willing to spend to achieve it?"

That is the TerrainIQ approach to advanced sediment barrier selection. First determine whether standard fence capacity is adequate. Then evaluate drainage area, sediment loading, labor availability, maintenance expectations, project specifications, visibility needs, removal requirements, and total installed cost. Only after those conditions are understood should the system be selected.

Advanced systems are not shortcuts around good erosion control practice. They are tools designed to solve specific field problems. When selected for the right reasons, they can improve performance, reduce labor, simplify maintenance, support compliance, and provide better total project value than traditional systems alone.

CHAPTER 5 - Sediment Tubes and Weighted Perimeter Controls

Fill Materials, Weight, Filtration, and Regional Availability

At first glance, many sediment tube products appear nearly identical.

Most consist of a tubular containment system placed directly on the soil surface to intercept runoff, reduce velocity, encourage sediment deposition, and reduce the movement of soil beyond the disturbed area. However, the material inside the tube often has a greater influence on performance, cost, maintenance, regulatory acceptance, and end-of-project handling than the outer containment itself.

Throughout the erosion control industry, manufacturers use a wide variety of fill materials, including straw, compost, wood fiber, pine straw, excelsior, miscanthus grass, kiln-dried inert media, and engineered blends. Each material offers unique advantages and limitations. Some are selected because they are economical and locally available. Others are chosen because they provide better filtration, longer service life, improved durability, or reduced risk of introducing unwanted seed or invasive plant material.

One of the most important lessons in this chapter is that sediment tube selection should not stop at diameter, length, or price. The fill material matters. It affects how the product performs during construction, how easily it can be installed and maintained, and what happens when the project is complete.

In many applications, natural or inert fill materials can be left on-site, incorporated into final grading, or allowed to remain in remote areas where doing so is appropriate and permitted. This can be a major advantage compared to products that must be removed, separated, hauled away, and disposed of as mixed construction waste. Reducing removal labor and landfill waste has become an increasingly important part of evaluating erosion control products across the full life of a project.

At the same time, not every fill material is appropriate for every region or regulatory environment. Miscanthus, for example, may raise concerns in areas where certain varieties are viewed as invasive or potentially invasive. Excelsior is widely respected as a strong erosion control material, but regional availability and freight costs can make it expensive east of the Mississippi River. Straw remains common throughout the South because it is readily available from local agriculture, cost effective, and familiar to contractors and inspectors.

Products such as Siltworm also introduce another important consideration: clean, inert fill material. A kiln-dried inert fill can provide value where users are concerned about introducing foreign weed seed, unwanted organic material, or potentially invasive species to a new site. For contractors, inspectors, engineers, and owners, that can become a meaningful advantage on sensitive projects, restoration areas, utility corridors, and sites where regulatory acceptance matters.

Understanding these differences is important because selecting the proper sediment tube often involves much more than choosing a product that looks right from the outside. The fill material frequently determines whether the BMP is practical, acceptable, economical, maintainable, and appropriate for the conditions encountered.

This chapter will examine sediment tubes, weighted perimeter controls, fill materials, regional availability, installation considerations, disposal advantages, and the practical field logic used to compare one system against another. As with every part of TerrainIQ, the goal is not to memorize product names. The goal is to understand what problem the product is trying to solve and whether its materials, performance, and lifecycle value match the project.

5.1 What Is a Sediment Tube?

A sediment tube is a linear erosion and sediment control BMP placed on the ground surface to intercept runoff, reduce flow velocity, encourage sediment deposition, and provide temporary containment. Most systems include an outer mesh or netting, internal fill material, end closures, and anchoring components when needed.

Although the outside of many sediment tubes appears similar, the fill material often determines how the BMP performs in the field. Weight, filtration, durability, decomposition, regulatory acceptance, removal requirements, and disposal options are all influenced by what is inside the tube.

This is why sediment tubes should not be evaluated by diameter alone. A straw wattle, compost filter sock, excelsior log, miscanthus tube, Siltworm product, Erosion Eel, synthetic wattle, or specialty sediment barrier may all occupy the same general category, but they can behave very differently under real site conditions.

The outer containment provides shape and structure. The fill material determines much of the performance.

5.2 Anchored vs Weighted Systems

Sediment tubes and perimeter controls generally fall into two broad categories: anchored systems and weighted systems.

Anchored systems rely primarily on stakes, pins, posts, or other fastening methods to hold the BMP in place. Straw wattles, coir logs, excelsior logs, and many alternate fill material logs are common examples. These products can perform well, but their effectiveness depends heavily on proper staking and ground contact. If the anchoring fails, the BMP often fails with it.

Weighted systems rely more heavily on self-ballasting. Compost filter sock, Erosion Eels, mulch tubes, and many alternate material socks use the weight of the fill material to help the product remain in place. These systems may still require staking in some applications, but they are often faster to install and can reduce labor compared to fully anchored products.

This distinction matters because it affects more than installation technique. Anchored systems may be economical and effective but can require more labor and closer attention to staking. Weighted systems may cost more initially but can reduce installation time, improve ground conformity, simplify removal, and reduce maintenance in the right applications.

The best choice depends on slope, runoff volume, soil conditions, project duration, maintenance expectations, and whether the BMP will be removed, left in place, or worked into the final grade.

5.3 Straw Filled Systems

Straw remains one of the most common fill materials used throughout the southeastern United States. The reason is simple: straw is abundant. Agricultural operations throughout Tennessee and the surrounding states produce large quantities of wheat straw and other agricultural byproducts that can be processed into erosion control products. Because the material is locally available, straw filled systems are often economical, familiar, and easy for contractors to obtain on short notice.

Straw filled products are commonly used for slope interruption, perimeter control, temporary runoff management, and general erosion control applications where cost and availability are important. They are lightweight, easy to handle, and widely accepted by regulators and inspectors throughout much of the South.

Straw also has an end-of-project advantage. In many applications, the material can be left in place, worked into final grading, or allowed to decompose naturally where permitted. This can reduce removal labor and limit the amount of material sent to landfills.

The limitations are equally important to understand. Straw is generally less dense than some alternative fill materials, may require staking to remain in place, and can decompose more quickly than longer-lasting products. In higher-flow conditions, steep slopes, or areas with repeated runoff exposure, straw filled systems may shift, flatten, degrade, or require more frequent maintenance.

Despite these limitations, straw remains a dominant fill material throughout much of the South because it offers a practical balance of cost, availability, acceptance, and performance. It may not be the highest-performing option in every condition, but it is often the most practical solution for common construction site applications.

5.4 Miscanthus Filled Systems

Miscanthus is a large perennial grass that has gained attention as a fill material for erosion control products in certain regions. It can provide a dense fiber structure, good sediment retention, consistent manufacturing characteristics, lightweight handling, and a relatively long service life compared to some other organic fill materials.

From a performance standpoint, miscanthus can be an attractive material. Its fiber structure can help slow runoff, trap sediment, and maintain shape during temporary erosion control applications. For manufacturers, it can also offer consistency because it can be grown, harvested, processed, and used as a repeatable fill source.

However, miscanthus also presents a major challenge: regulatory acceptance.

Certain varieties of miscanthus are considered invasive or potentially invasive in some states and regions. Because of that concern, some regulatory agencies, project owners, engineers, or environmental reviewers may restrict or prohibit its use. This is especially important on public projects, environmentally sensitive sites, restoration areas, utility corridors, and projects near wetlands, streams, or protected habitats.

This creates an important lesson for erosion control professionals. Product performance is not the only factor that matters. A BMP may perform well hydraulically and still be unacceptable if the local jurisdiction, owner, or regulator will not allow the material on-site.

For this reason, miscanthus filled systems often experience varying levels of acceptance depending on geography, project type, and local regulation. Before recommending or supplying a miscanthus product, it is important to verify whether the material is allowed by the governing specification and accepted by the reviewing authority.

The product may work, but the project still has to permit its use.

5.5 Excelsior Filled Systems

Excelsior consists of curled wood fibers produced primarily from aspen and other wood species. Historically, it has been one of the most effective natural erosion control materials available.

The performance advantages are well understood within the erosion control industry. Excelsior fibers provide strong filtration characteristics, good sediment retention, high resiliency, and reliable hydraulic performance. The curled wood fibers create a dense, interlocking structure that can slow runoff, capture sediment, and hold its shape better than some lighter organic fill materials.

Many erosion control professionals consider excelsior one of the best-performing natural fill materials available. Its challenge is not usually performance. Its challenge is economics.

Excelsior production is concentrated largely in the western United States, where the raw material and manufacturing infrastructure are more readily available. As transportation costs increase, excelsior products can become significantly more expensive east of the Mississippi River. That geographic reality has limited widespread adoption throughout many eastern and southeastern markets, including much of the South.

This creates another important lesson in BMP selection. A product may perform exceptionally well and still be limited by availability, freight cost, and market practicality. For projects where performance is the highest priority and cost is less restrictive, excelsior can be an excellent option. For many everyday construction applications in the Southeast, straw, compost, inert media, or other locally available materials may provide a more practical balance of cost and performance.

5.6 Siltworm – Kiln Dried Inert Fill System

Siltworm represents an important category of sediment tube technology because its value is tied directly to the material inside the product.

Unlike straw, compost, miscanthus, or other organic agricultural fill materials, Siltworm uses a proprietary recycled wood fiber fill that is kiln-dried and low moisture. The company describes its fill as recycled, biodegradable, weed-free, seed-free, disease-free, and bark-free. This matters because the fill material is intended to reduce the risk of introducing foreign weed seed, unwanted organic material, or potentially invasive species to a project site.

From a field perspective, that can be a meaningful advantage. Contractors, inspectors, engineers, and owners are not only evaluating whether the BMP can slow runoff and capture sediment. They are also evaluating whether the material is acceptable for the site, whether it creates future vegetation concerns, and what happens to the product after construction is complete.

Siltworm systems are designed to be placed on the ground surface with minimal trenching or staking in many applications. The product can be shaped, moved, and adjusted as site conditions change, which gives it flexibility compared to trenched silt fence or more labor-intensive systems. Siltworm also promotes controlled flow through the rolled filter while retaining sediment upstream.

The end-of-project handling is another major part of the value proposition. In many applications, the sock can be cut open, the fill material can be spread into the final grade, and the outer netting can be removed and disposed of separately. This reduces mixed construction waste and can significantly reduce the labor associated with pulling, separating, and hauling traditional erosion control materials at project closeout. Siltworm's published product information specifically notes that the fill can be moved into final grade while non-biodegradable materials are removed.

Like every BMP, Siltworm is not appropriate for every condition. It still must be matched to the drainage area, slope, flow condition, expected sediment loading, and project specification. It may perform well as a perimeter control, slope interruption device, inlet protection component, or temporary sediment barrier, but concentrated flow and high-energy drainage paths still require careful evaluation.

The important lesson is that Siltworm should not be viewed simply as another sediment tube. Its differentiation comes from the fill material, installation flexibility, reduced invasive species concern, and cleaner end-of-project handling. For projects where weed seed, disposal, labor, and regulatory acceptance matter, kiln-dried inert fill systems can offer advantages that go beyond basic sediment control performance.

5.7 Wood Fiber, Compost and Engineered Media Systems

Many sediment tube manufacturers use wood fiber, compost, or engineered media blends as fill materials. These systems are designed to balance several competing needs, including weight, filtration, sediment retention, longevity, sustainability, installation efficiency, and end-of-project handling.

Wood fiber systems often provide a practical middle ground between straw and higher-cost specialty materials. Depending on the source material and manufacturing process, wood fiber can provide good structure, reasonable filtration, and improved consistency compared to some agricultural byproducts. Engineered wood fiber blends may also reduce concerns related to foreign weed seed or inconsistent organic content when compared to less controlled natural materials.

Compost filter sock systems are another common category. Compost can provide strong filtration characteristics and good ground contact while allowing water to move through the media. These systems are widely used for perimeter control, slope interruption, inlet protection, and construction entrance applications. Their performance depends heavily on the quality and consistency of the compost media, the particle size distribution, the containment mesh, and the installation method.

Engineered media systems attempt to improve consistency by blending materials for specific performance objectives. Some focus on filtration. Others focus on weight, durability, longevity, or environmental compatibility. Products such as Siltworm illustrate how fill material can become a major differentiator, especially when the media is kiln-dried, inert, and intended to reduce concerns related to weed seed, invasive species, or unwanted organic material.

One of the advantages of many wood fiber, compost, and engineered media systems is end-of-project flexibility. In appropriate applications, the fill material may be left in place, spread into final grade, or incorporated into remote areas where permitted. This can reduce removal labor and minimize mixed construction waste compared to products that must be fully removed and hauled to a landfill.

Performance varies significantly between manufacturers. Two sediment tubes may look similar from the outside but behave very differently depending on the fill material, density, moisture content, mesh type, diameter, and manufacturing consistency. For this reason, these products should be evaluated individually rather than treated as interchangeable.

The important lesson is that engineered media systems are not simply alternate versions of straw wattles or filter sock. Their value depends on what the fill material is designed to accomplish and whether that performance matches the project conditions.

5.8 Comparing Common Fill Materials

When evaluating sediment tubes, the fill material influences far more than appearance. It affects how the product installs, how much it weighs, how well it conforms to the ground, how long it lasts, how much sediment it can retain, and what happens when the project is complete.

Straw is often favored in the South because it is readily available, economical, familiar to contractors, and generally accepted by regulators. Its limitations are lower density, shorter service life, and the need for proper staking in many applications.
Miscanthus can offer good fiber density and sediment retention, but regulatory acceptance may be a concern where certain varieties are viewed as invasive or potentially invasive. In those cases, performance alone does not determine whether the product can be used.

Excelsior is widely respected for its filtration, resiliency, and hydraulic performance, but freight cost and regional availability can limit its use east of the Mississippi River. It may be an excellent performer while still being impractical for many everyday projects in the Southeast.

Compost and wood fiber systems can provide strong filtration and ground contact, but performance depends heavily on media quality, consistency, moisture content, and manufacturing standards. Engineered media systems, including kiln-dried inert fill products such as Siltworm, may offer advantages where users want cleaner fill material, reduced weed seed concern, less invasive species risk, and more flexible end-of-project handling.

End-of-project disposal should also be part of the comparison. In many applications, natural or inert fill materials can be left in place, worked into final grade, or spread in remote areas where permitted. This can reduce removal labor and minimize mixed construction waste. Products that require full removal, separation, or landfill disposal may carry hidden costs that are not obvious when comparing material price alone.

No single fill material is ideal for every application. The most appropriate choice depends on project goals, site conditions, geographic location, regulatory requirements, product availability, installation labor, maintenance expectations, and total lifecycle cost.

5.9 Geography Influences BMP Selection

One of the most overlooked realities in erosion control is that regional availability often drives product selection.

A product may perform well in testing, appear frequently in manufacturer literature, or be common in one part of the country, yet remain uncommon in another region because of freight cost, raw material availability, contractor familiarity, or regulatory preference. Erosion control products are not selected in a vacuum. They are selected within a local market.

Excelsior provides a good example. In portions of the western United States, excelsior products may be more readily available and cost competitive because production and supply chains are closer to the project location. East of the Mississippi River, and particularly in the Southeast, freight costs can make the same products significantly more expensive, even though their performance characteristics remain strong.

Straw provides the opposite example. In Tennessee and much of the South, straw is readily available because of local agricultural production. Farmers throughout the region produce material that can be processed into wattles, blankets, and other erosion control products. This availability helps explain why straw products are so common on southern construction sites. They are not always selected because they are the highest-performing option in every condition. They are often selected because they provide a practical balance of availability, cost, acceptance, and performance.

Other regions may favor compost, wood fiber, coir, engineered media, or inert fill systems depending on local materials, environmental requirements, and market history. In environmentally sensitive areas, concerns about weed seed, invasive species, or organic content may push users toward kiln-dried inert fill products such as Siltworm. In restoration settings, longer-lasting natural fiber products may be preferred. In large urban markets, disposal, labor, and end-of-project handling may become more important factors.

Understanding regional supply chains helps explain why products that perform well in one part of the country may rarely appear in another. The best BMP is not always the product with the strongest theoretical performance. It is often the product that meets the project requirements, satisfies the regulator, fits the budget, can be sourced reliably, and can be installed and maintained by the contractor.

Regional availability does not replace engineering judgment, but it does influence practical decision-making. Experienced erosion control professionals understand both the product and the market in which that product must perform.

Chapter Summary

Sediment tubes and weighted perimeter controls may appear similar from the outside, but their performance is heavily influenced by what is inside.

Throughout this chapter, we examined how fill materials affect installation, weight, filtration, sediment retention, durability, maintenance, regulatory acceptance, end-of-project handling, and total cost. Straw, miscanthus, excelsior, compost, wood fiber, kiln-dried inert fill, and engineered media systems each offer different advantages and limitations. The correct choice depends less on appearance and more on how the material performs under the conditions it will encounter.

One of the most valuable lessons for contractors, estimators, engineers, and inspectors is that product selection is often influenced by economics and logistics as much as performance. Excelsior may outperform straw in certain applications, but freight costs and regional availability may make it less practical in the Southeast. Miscanthus may offer attractive performance characteristics, but regulatory concerns related to invasive species can limit its acceptance. Siltworm and other kiln-dried inert fill systems may offer advantages where weed seed, invasive species risk, cleaner fill material, and end-of-project disposal are important considerations.

Regional availability plays a major role in BMP selection. Throughout Tennessee and much of the South, straw remains one of the benchmark fill materials because it is readily available, economical, accepted by regulators, familiar to contractors, and supported by local agricultural supply chains. In other regions, compost, excelsior, wood fiber, coir, or engineered media may be more common because local supply conditions, specifications, and environmental priorities are different.

End-of-project handling should also be considered. In many applications, natural or inert fill materials can be left in place, incorporated into final grading, or spread in remote areas where permitted. This can reduce removal labor and minimize mixed construction waste. Products that must be fully removed, separated, or hauled to a landfill may carry hidden costs that are not always obvious when comparing material price alone.

The TerrainIQ approach is to begin with the application, determine whether the BMP will function as an anchored or weighted system, evaluate local regulatory requirements, compare available fill materials, and then balance performance, availability, cost, installation labor, maintenance expectations, and disposal requirements. The goal is not to select the most sophisticated product. The goal is to select the most practical solution for the site, the specification, the contractor, and the conditions.
Sometimes the best product is not the highest-performing product on paper. Sometimes it is the product that consistently solves the problem at the lowest total cost while satisfying the project requirements and fitting the realities of the local market.

CHAPTER 6 - Straw Wattles and Fiber Rolls

Slope Interruption, Runoff Control, and Temporary Stabilization

Long before filter sock and advanced sediment tubes became common, contractors relied on straw wattles to interrupt runoff, reduce erosion, and trap sediment. Today, straw wattles remain one of the most widely used erosion control BMPs because they are affordable, familiar, versatile, and effective when installed correctly.

Although wattles appear simple, they serve an important purpose. Their greatest value is not stopping water at the bottom of a site. Their value is slowing water before it gains too much energy. When installed across a slope, wattles reduce runoff velocity, shorten effective slope length, and create opportunities for sediment to settle before larger erosion problems develop.

Straw wattles and fiber rolls are typically manufactured with straw or other natural fibers enclosed in an outer netting, which may include poly netting, photodegradable polypropylene netting, biodegradable netting, natural twine, jute netting, or other fiber-based containment materials depending on the manufacturer and project requirements.

Understanding wattles requires understanding their intended role. They are not miniature dams, and they are not designed to manage heavy concentrated flow. They are slope management tools used to interrupt runoff, reduce erosion potential, and support a broader erosion and sediment control strategy.

6.1 What Is a Straw Wattle?

A straw wattle is a tubular erosion control BMP made from straw or similar organic fiber enclosed within an outer netting. Depending on the manufacturer and project requirements, that netting may be poly, photodegradable polypropylene, biodegradable, natural twine, jute, or another fiber-based containment material.

The finished product is typically placed directly on the ground surface and secured with stakes where needed. Because wattles are relatively lightweight, installation quality matters. A wattle that is not properly staked, seated, or kept in contact with the soil can float, roll, shift, or allow runoff to pass underneath.

The primary purpose of a straw wattle is to slow water before it gains too much energy. When installed across a slope, it interrupts runoff, reduces velocity, encourages sediment deposition, and helps manage erosion before the water reaches the bottom of the slope.

Straw wattles are not designed to function as dams or high-flow barriers. They are temporary slope management tools used to reduce runoff energy, support sediment control, and improve the overall performance of the erosion control system.

6.2 How Wattles Work

The effectiveness of wattles is based on a simple hydraulic principle: slow the water before it becomes a problem.

As runoff approaches a properly installed wattle, the water slows and may pond slightly behind the product. This reduction in velocity reduces erosive energy, allows heavier soil particles to settle, and creates a small opportunity for infiltration before runoff continues downslope.

This is why wattles are so useful on disturbed slopes. Rather than waiting for all the runoff and sediment to arrive at the bottom, wattles interrupt the process earlier. Each row of wattles shortens the effective slope length and reduces the amount of energy water can build before reaching the next control point.

In that sense, wattles are not simply perimeter controls. They are slope interruption tools. Their value comes from managing runoff while it is still shallow and manageable, before it concentrates, accelerates, or begins cutting rills into the slope.

When used correctly, wattles help prevent small runoff problems from becoming larger erosion failures.

6.3 Straw Wattle Construction

Although straw wattles appear simple, their construction has a direct influence on field performance.

Most wattles begin with a core material, typically agricultural straw or a similar natural fiber. That core provides the body of the product and helps slow runoff as water encounters the wattle. Density, consistency, and fiber quality all affect how well the wattle holds its shape and performs over time.

The core is enclosed in an outer containment netting. Depending on the manufacturer and specification, this may include plastic netting, photodegradable polypropylene netting, biodegradable netting, natural twine, jute netting, or other fiber-based materials. The netting holds the straw together, gives the product its tubular shape, and affects how the wattle handles during installation and removal.

A fastening or anchoring system is usually required to keep the wattle in position. Wood stakes are most common, although steel pins or other anchoring methods may be used depending on slope, soil conditions, runoff volume, and project requirements.

Construction quality matters. A loosely packed wattle may flatten, shift, or lose effectiveness quickly. A well-made product with consistent fill, durable netting, and proper anchoring has a much better chance of maintaining ground contact and performing as intended.

6.4 Manufacturer Technologies

Several manufacturers supply straw wattles and related fiber roll products throughout the erosion control industry.

In the Southeast, Terrain Civil commonly encounters products from suppliers such as Western Green / MKB, while companies such as American Excelsior, Cherokee Manufacturing, regional producers, and private-label manufacturers also serve different markets and project types.
At a basic level, most straw wattles perform the same general function. They are tubular erosion control products designed to slow runoff, interrupt slope length, and encourage sediment deposition. However, not all wattles are manufactured the same way.

Manufacturers may differ in straw density, netting material, product diameter, roll length, packaging, consistency, and durability. One wattle may be tightly packed and hold its shape well during installation, while another may be lighter, looser, or more prone to flattening. Some products may use poly netting or photodegradable polypropylene netting, while others may use biodegradable netting, natural twine, jute, or other fiber-based containment materials.

These differences matter in the field. A contractor may prefer one product because it handles better, stakes more cleanly, stores well, or arrives packaged in a way that improves jobsite efficiency. An inspector may care more about whether the product matches the approved specification and remains in proper contact with the ground after installation. An owner or engineer may focus on durability, biodegradability, project duration, or environmental requirements.

Understanding manufacturer differences helps users select products appropriate for the project rather than assuming every straw wattle is identical. The concept is simple, but quality, consistency, packaging, and material selection can all influence how the product performs once it is installed.

6.5 Staking and Ground Contact

Most wattle failures can be traced to installation issues rather than product defects. The product may be appropriate for the application, but if it is not placed correctly, seated tightly to the ground, and anchored properly, runoff will find a way around it or beneath it.

Proper installation begins with alignment. Wattles should generally be installed along the contour of the slope so runoff reaches the product evenly. If the wattle is installed at the wrong angle, water may begin traveling along the product instead of slowing behind it. Once that happens, the wattle can unintentionally create a concentrated flow path.

Ground contact is just as important as alignment. The wattle should rest tightly against the soil surface. If it is placed across clods, debris, voids, or uneven grade, runoff can pass underneath. In some applications, installers may lightly trench or seat the wattle into a shallow depression to improve contact. This is not the same as burying silt fence. The goal is simply to make sure water encounters the wattle rather than flowing beneath it.

Staking methods vary depending on the product, slope, soil conditions, runoff volume, and project specification. One common method is to drive wood stakes directly through the wattle to pin it to the ground. This can provide strong holding power and is simple for crews to understand, but it may damage the product if done carelessly or if the wattle is loosely packed.

Another method is to place stakes immediately on the downslope side of the wattle. This helps brace the product without penetrating it. The advantage is that the wattle remains intact, but the system depends on the stakes being close enough and deep enough to prevent rolling or displacement.

On steeper slopes or higher-risk areas, installers may use opposing stakes or a crisscross X-style staking pattern. This can provide additional resistance against movement and help hold the wattle tight to the slope. The tradeoff is additional labor and material, so it is usually reserved for more demanding conditions.

Wood stakes are the most common anchoring method because they are economical, readily available, and easy to install. Steel pins or posts may be used where additional holding power is needed, especially in harder soils, steeper slopes, or locations with greater runoff pressure. Combination systems may also be used when the site conditions require more support than standard staking provides.

Adjacent sections should overlap or connect according to the manufacturer's recommendations so water cannot pass between rolls. The objective is to create a continuous slope interruption system, not a series of disconnected products.

The best installation is the one that keeps the wattle in place and tight to the ground throughout the storm event. If the water can lift it, roll it, cut under it, or bypass between sections, the installation is not finished.

6.6 Slope Interruption Applications

One of the most important uses of wattles is slope interruption.

As runoff travels downslope, it gains velocity and erosive energy. If water is allowed to move across the full length of a disturbed slope without interruption, it can begin cutting rills, transporting sediment, and overloading the perimeter controls at the bottom.

Installing wattles at intervals breaks the slope into smaller segments. Each row slows the water, reduces runoff accumulation, and creates an opportunity for sediment to settle before the water continues downslope.

This is why wattles are often more effective on the slope than at the bottom of the slope. A perimeter control installed only at the base must manage all the runoff and sediment from above. Slope interruption reduces that burden by treating the problem earlier.

The proper spacing depends on slope steepness, slope length, soil conditions, rainfall intensity, product size, and project specifications. Steeper or longer slopes generally require closer spacing because runoff gains energy more quickly.

The principle is simple: do not wait until water becomes powerful. Slow it while it is still manageable.

6.7 Common Wattle Failures

Most wattle failures are caused by installation, application, or maintenance problems rather than defects in the product itself.

Improper staking is one of the most common issues. If stakes are spaced too far apart, driven too shallow, or placed on the wrong side of the product, the wattle can shift, roll, or float during a storm event. Once the product moves, it no longer provides consistent slope interruption.
Poor ground contact is another frequent problem. A wattle must sit tightly against the soil surface. If gaps exist beneath the product, runoff will pass underneath instead of slowing behind it. This often leads to undercutting, sediment bypass, and erosion immediately downslope.

Alignment also matters. Wattles should generally follow the contour of the slope. If they are installed at an angle that directs water along the product, runoff can become concentrated and create the very erosion problem the wattle was intended to prevent.

Maintenance is equally important. As sediment accumulates behind the wattle, the product loses storage capacity and effectiveness. Damaged, displaced, buried, or overloaded wattles should be repaired, reset, cleaned out, or replaced as needed.

Excessive flow is another common cause of failure. Wattles are slope interruption tools, not high-flow barriers. If they are placed in concentrated flow areas or expected to manage more runoff than they were designed to handle, failure becomes likely.

Understanding these failure modes helps improve installation quality and overall performance. A properly selected wattle still has to be properly placed, anchored, maintained, and matched to the conditions on the site.

Chapter Summary

Straw wattles are among the most familiar erosion control BMPs in the industry, but they are often misunderstood.

Many contractors think of wattles primarily as perimeter control products. In reality, their greatest value often comes from slope interruption.

A properly spaced series of wattles can slow runoff before it gains too much velocity, shorten the effective slope length, reduce sediment movement, and lower the burden placed on perimeter controls at the bottom of the site. This proactive approach often produces better results than waiting until all runoff and sediment have accumulated at the base of a disturbed slope.

Throughout this chapter, we learned that wattles are simple products with important installation requirements. The core material, netting type, product density, staking method, ground contact, and alignment all influence performance. Whether a wattle uses poly netting, biodegradable netting, natural twine, jute netting, or another containment material, it still must be placed correctly and anchored properly to function as intended.

The TerrainIQ approach begins by evaluating slope length and steepness, determining whether slope interruption is needed, establishing spacing requirements, selecting the appropriate anchoring method, and verifying that each wattle is installed along the contour with continuous ground contact. If runoff can pass under the product, flow along it, lift it, roll it, or bypass between sections, the installation is not complete.

The most important lesson from this chapter is that wattles work best when used proactively. Their purpose is not to stop heavy concentrated flow at the bottom of a slope. Their purpose is to slow water early, reduce erosion potential, and prevent small runoff problems from becoming larger failures downstream.

Most wattle failures are not product failures. They are installation, application, or maintenance failures. When wattles are properly selected, properly spaced, properly staked, and properly maintained, they remain one of the most practical and effective slope interruption tools available.

CHAPTER 7 - Filter Sock Technologies

Media Selection, Filtration, Flexibility, and Ground Contact

Few erosion and sediment control products have experienced greater growth over the past two decades than filter sock.

Originally developed as an alternative to traditional silt fence and straw wattles, filter sock systems have become common perimeter control BMPs in many regions of the United States. Their popularity comes from a practical combination of rapid installation, flexibility, good ground contact, reduced trenching, and the ability to function as both a perimeter control and a slope interruption device.

Unlike many traditional BMPs, filter sock systems are often classified as weighted sediment barriers. Rather than depending entirely on stakes, posts, or trenching, they use the weight of the contained media to help remain in place while allowing runoff to pass through at reduced velocity. This makes them especially useful where fast installation, adaptability, and close contact with uneven ground are important.

Filter sock can serve several roles on a construction site. It may be used along a perimeter to intercept sheet flow, across a slope to interrupt runoff, around inlets to reduce sediment entry, or near construction entrances to help manage sediment tracking and runoff. In some applications, it can also be adjusted, relocated, or removed more easily than trenched silt fence.

The material inside the sock matters. Compost, wood fiber, engineered media, kiln-dried inert fill, and other blends can all influence weight, filtration, sediment retention, longevity, regulatory acceptance, weed seed concerns, invasive species concerns, and end-of-project handling. Two filter socks may look similar from the outside but perform very differently because of what is inside.

This is especially important when considering cleanup and disposal. In many applications, certain natural or inert fill materials can be left on-site, spread into final grade, or used in remote areas where permitted. That can reduce removal labor and limit mixed construction waste. Other products may require more complete removal or disposal depending on the fill material, containment mesh, project specification, and site conditions.

Understanding filter sock technology requires more than knowing the diameter or roll length. It requires understanding the media, the containment system, the flow condition, the installation method, the maintenance expectation, and what happens when the project is complete.

This chapter examines how filter sock works, where it performs well, where it has limitations, and how different systems should be evaluated before they are selected for a project.

7.1 What Is Filter Sock?

Filter sock is a tubular sediment control BMP made from permeable mesh filled with filtering media. It is typically placed directly on the soil surface where it intercepts runoff, slows water movement, encourages sediment deposition, and filters suspended solids.

Unlike silt fence, which functions as a more defined vertical barrier, filter sock is designed to let water move through the system at a reduced velocity. As runoff passes through or ponds slightly behind the sock, sediment can settle or become trapped within the media.

This design gives filter sock a high degree of versatility. It can be used for perimeter control, slope interruption, inlet protection, construction entrances, temporary runoff management, and in some cases low-energy ditch check applications where the product is appropriate for the flow condition.

Contractors often like filter sock because it installs quickly, conforms well to uneven ground, and does not usually require trenching like silt fence. Inspectors often focus on whether the sock maintains continuous ground contact, whether sections are properly overlapped or connected, and whether sediment accumulation has reduced performance.

The fill material is one of the most important parts of the system. Compost, wood fiber, engineered media, inert fill, or other blends can all affect weight, filtration, longevity, maintenance, regulatory acceptance, and cleanup at the end of the project.

Filter sock has become popular because it is flexible, practical, and adaptable. Like every BMP, however, it performs best when the product, media, diameter, placement, anchoring, and maintenance expectations match the conditions on the site.

7.2 How Filter Sock Works

Filter sock works by combining several sediment control mechanisms in one product.

As runoff reaches the sock, the system first slows the water. This velocity reduction is important because slower water carries less energy and has less ability to transport sediment. As the water slows, heavier soil particles begin to settle upstream of the sock rather than continuing downslope.

At the same time, the permeable mesh and internal media provide filtration. Water can pass through the sock, but suspended solids are slowed, captured, or retained within the media. The quality, density, moisture content, and consistency of the fill material all influence how effectively this process occurs.

Filter sock can also provide temporary containment. In many applications, shallow ponding occurs behind the sock, giving sediment more time to drop out before water moves through or around the BMP. This combination of velocity reduction, filtration, sediment deposition, and temporary containment gives filter sock more flexibility than many traditional perimeter controls.

The key is matching the product to the flow condition. Filter sock can perform very well under sheet flow and moderate runoff conditions, but it still has limits. If the drainage area is too large, the slope is too steep, or runoff has become concentrated and high energy, the system may require a larger diameter, closer spacing, additional staking, or a different BMP altogether.

7.3 Siltworm

Siltworm represents one of the more innovative evolutions within the filter sock market because it focuses on the two areas that matter most in the field: filtration performance and practical jobsite efficiency.

Unlike many traditional sediment control products, Siltworm is designed as a rolled filtration system rather than a diversion-based barrier. The product is placed directly on the ground surface, where it allows runoff to pass through at a controlled rate while separating and retaining sediment and other jobsite pollutants. This distinction is important because effective erosion control is not always about holding water back. In many applications, the better solution is to slow the water, filter it, and allow it to continue moving in a more controlled manner.

Siltworm's fill material is one of its primary differentiators. The system uses a proprietary blend of recycled, kiln-dried material designed to provide consistent filtration performance while reducing several common concerns associated with organic fill products. Because the material is kiln-dried and processed, Siltworm promotes its fill as weed-free, seed-free, disease-free, and bark-free. For contractors, engineers, inspectors, and owners, that can matter on projects where foreign weed seed, unwanted organic material, or potentially invasive species are a concern.

The system also offers important installation advantages. Siltworm can be laid directly on the ground surface with minimal trenching or staking in many applications. It can be shaped, moved, reused, and adjusted as site conditions change. This gives contractors flexibility that traditional trenched silt fence often does not provide, especially on projects where grading limits, access routes, slope conditions, or construction sequencing continue changing during the job.

From a performance standpoint, Siltworm's value comes from combining velocity reduction, filtration, sediment retention, and controlled runoff movement in one system. The company describes the product as an effective and powerful filter designed to separate and retain sediment and pollutants while improving downstream water quality. As with any BMP, actual performance depends on proper sizing, placement, flow condition, drainage area, maintenance, and compliance with project specifications.

Siltworm also has a strong end-of-project advantage. In many applications, the rolled filter can be cut open, the fill material can be moved into final grade or beneficially reused where permitted, and the netting can be removed separately. This can reduce removal labor and limit mixed construction waste compared to products that must be fully pulled, separated, hauled, and disposed of.

For TerrainIQ, the important lesson is that Siltworm should not be viewed simply as another filter sock. Its value proposition includes consistent media quality, controlled flow, sediment and pollutant retention, installation flexibility, reduced weed seed and invasive species concern, reusability, and cleaner project closeout. Those advantages can make it especially attractive where contractors want a higher-performance alternative to traditional silt fence, straw wattles, or standard filter sock products.

Like every erosion control BMP, Siltworm is not a universal solution. It must still be matched to the site conditions. However, where the application calls for a flexible, efficient, reusable, media-based filtration product, Siltworm demonstrates how modern filter sock technology continues moving beyond simple sediment containment toward more complete jobsite runoff management.

7.4 Other Filter Sock Manufacturers

While Siltworm represents a higher-performance and more differentiated approach within the filter sock market, several other manufacturers and regional suppliers also serve important roles throughout the industry.

Core Erosion has become a significant supplier of filter sock products throughout portions of the Southeast. Its products are commonly used for site perimeter control, slope interruption, construction entrances, and temporary erosion control applications. Core products have gained market acceptance largely because they offer contractors a practical balance between performance, cost, and availability.

That balance matters. Not every project requires the highest-performing product available. Some sites need an economical sediment control solution that is readily available, familiar to contractors, and acceptable for common construction applications. In those situations, Core and similar regional suppliers can provide a useful option.

Other manufacturers also hold strong positions within the filter sock market. Diamond Sock is known for a variety of sediment control and filtration products. Filtrexx is widely recognized as one of the pioneers in compost filter sock technology and helped establish the category in many markets. Numerous regional producers also manufacture filter sock products using locally available compost, wood fiber, or other media suited to their markets.

Although product performance varies between manufacturers, the fundamental principles remain the same. Filter sock systems are intended to slow runoff, promote sediment deposition, provide filtration, and maintain ground contact. The differences usually appear in media quality, fill consistency, netting, diameter, weight, availability, cost, regulatory acceptance, and end-of-project handling.

The important lesson is that filter sock products should not be treated as identical simply because they look similar from the outside. A lower-cost product may be appropriate for common temporary applications, while a more advanced system may be justified where filtration performance, media consistency, reusability, weed seed concerns, or disposal considerations matter more.

7.5 Installation Methods

One of the primary advantages of filter sock is installation flexibility.

Unlike trenched silt fence, filter sock is typically placed directly on the ground surface with minimal disturbance. This can reduce labor, preserve soil structure, and allow faster installation, especially on projects where conditions change as grading progresses.

Proper installation begins with ground contact. The sock should sit tightly against the soil so runoff encounters the BMP rather than passing beneath it. If the product bridges over clods, debris, ruts, or uneven grade, water can bypass underneath and carry sediment downslope.
Alignment matters as well. Filter sock should generally follow contour lines when used for perimeter control or slope interruption. If installed at the wrong angle, it can unintentionally collect and direct runoff along the sock, creating concentrated flow instead of reducing it.

Sections should be overlapped, butted tightly, or connected according to manufacturer recommendations and project specifications. The goal is to create a continuous system without gaps where runoff can escape.
Although filter sock is often considered a weighted system, staking may still be required in many applications. Stakes are commonly used on slopes, around inlets, near construction entrances, in areas with higher runoff pressure, or anywhere the sock may shift, roll, or float during a storm event.

Staking methods vary by product and site condition. Some installations use stakes driven directly through the sock. Others use stakes placed immediately downslope to brace the product without penetrating it. In more demanding locations, installers may use opposing stakes, angled stakes, or crisscross staking to provide additional resistance against movement.

The correct anchoring method depends on slope, soil condition, sock diameter, runoff volume, product weight, manufacturer instructions, and governing specification. The purpose is always the same: keep the sock in position and in contact with the ground until the storm event is over.

Filter sock can reduce installation labor, but it still requires judgment. A product that is easy to install can still fail if it is placed poorly, left unsecured where staking is needed, or allowed to lose ground contact.

7.6 Maintenance Requirements

Like all perimeter controls, filter sock requires periodic inspection and maintenance.

A properly selected and installed filter sock can still lose effectiveness if sediment accumulates, sections are displaced, the product is damaged, or ground contact is lost. After storm events, installers and inspectors should look for signs that runoff is bypassing the sock, cutting underneath it, ponding excessively, or carrying sediment beyond the intended control area.

Common maintenance includes removing accumulated sediment, resetting displaced sections, repairing damaged mesh, replacing deteriorated material, and re-establishing ground contact where the sock has shifted or settled. If the product has become flattened, torn, buried, overloaded, or clogged, replacement may be more practical than repair.

Maintenance requirements depend on the application. A sock used for light perimeter control may require only occasional attention. A sock used near a construction entrance, inlet, slope, or high-sediment area may need more frequent inspection and cleanup.

The key lesson is that filter sock is not a set-it-and-forget-it BMP. Its performance depends on staying in place, staying in contact with the ground, and maintaining enough capacity to slow and filter runoff. Failure to maintain the system can reduce performance regardless of product quality.

7.7 Advantages and Limitations

Filter sock has become popular because it solves several practical field problems at once. It installs quickly, conforms well to uneven ground, reduces the need for trenching, and can serve multiple roles across a construction site. The same product may be used for perimeter control, slope interruption, inlet protection, construction entrance support, or temporary runoff management depending on the application.

Another major advantage is ground contact. Because filter sock is flexible and weighted by its fill material, it can often conform to irregular surfaces better than more rigid systems. This helps reduce gaps where runoff might otherwise pass underneath the BMP.

Filter sock can also reduce labor. In many applications, it can be placed, adjusted, relocated, or removed more efficiently than traditional silt fence. Certain fill materials also provide end-of-project advantages. Where permitted, compost, wood fiber, kiln-dried inert fill, or similar media may be spread into final grade, worked into the soil, or left in remote areas rather than hauled away as mixed construction waste. This can reduce removal labor, disposal cost, and landfill volume.

The limitations are equally important. Filter sock can become overloaded if drainage area, runoff volume, sediment loading, or flow velocity exceed the product's capacity. It still requires inspection and maintenance, especially after storm events. Performance also varies significantly by media type, sock diameter, mesh, density, installation method, and manufacturer quality.

Some filter sock products may degrade, clog, flatten, tear, or require replacement after extended use. In higher-energy conditions, staking or additional anchoring may be required to prevent movement.

The best way to evaluate filter sock is honestly. It is a flexible, efficient, and useful BMP, but it is not unlimited. When matched to the right application and maintained properly, it can provide excellent value. When overloaded or neglected, it can fail like any other perimeter control.

Chapter summary

The growth of filter sock reflects a broader shift in the erosion control industry. Contractors increasingly want products that reduce labor, improve flexibility, and perform reliably without requiring the same level of trenching or installation effort as traditional silt fence.

Filter sock addresses that need by combining several functions in one product. It slows runoff, encourages sediment deposition, provides filtration, maintains good ground contact, and can be used in multiple locations across a project. Depending on the application, it may function as perimeter control, slope interruption, inlet protection, construction entrance support, or temporary runoff management.

Media selection is one of the most important lessons from this chapter. Compost, wood fiber, engineered media, kiln-dried inert fill, and other materials can all influence weight, filtration, longevity, maintenance, regulatory acceptance, weed seed concerns, invasive species concerns, and project closeout. Siltworm and similar higher-performance systems show how filter sock technology continues moving beyond basic sediment containment toward more complete jobsite runoff management.
Filter sock also offers end-of-project advantages that should not be overlooked. In many applications, certain fill materials can be spread into final grade, worked into the soil, or left in remote areas where permitted. This can reduce removal labor, disposal cost, mixed construction waste, and landfill volume.

The TerrainIQ approach begins by evaluating runoff conditions, drainage area, installation constraints, available media options, maintenance expectations, and project requirements. The best filter sock system is not always the cheapest or the most advanced. It is the one that best fits the water, the sediment, the site conditions, the specification, and the contractor's ability to install and maintain it.

Filter sock is versatile, efficient, and increasingly common, but it still has limits. When properly selected, installed, staked where needed, and maintained, it can provide excellent value. When overloaded, neglected, or used in the wrong flow condition, it can fail like any other perimeter control.

CHAPTER 8 - Erosion Eels and High-Performance Sediment Tubes

Durable BMPs for Demanding Field Conditions

Most sediment control BMPs are designed to balance performance, installation speed, maintenance requirements, durability, and cost. Traditional straw wattles, filter sock, and sediment tubes can all perform well when matched to the right site conditions, but they also have limitations. Some are lightweight and require staking. Some lose shape over time. Some degrade during longer projects. Others require frequent maintenance or replacement when exposed to repeated runoff events.

Erosion Eels occupy a different position in the erosion control market.

While they perform many of the same basic functions as other sediment barriers, Erosion Eels are designed as a higher-performance solution for more demanding applications. Their value comes from durability, weight, hydraulic performance, service life, and the ability to function in applications where traditional wattles or standard sediment tubes may struggle.

Like other sediment control products, Erosion Eels are used to slow runoff, encourage sediment deposition, reduce erosion, and help manage how water moves across disturbed areas. The difference is that they are often selected when the project requires a more robust system - one that can better resist movement, maintain shape, handle repeated storm exposure, and reduce maintenance over the life of the project.

Contractors often appreciate Erosion Eels because they can reduce repeated repairs in difficult locations. Inspectors value them because they provide a more durable and visible control measure in areas where lesser products may fail. Engineers and owners may consider them when project duration, runoff conditions, environmental sensitivity, or maintenance access justify a higher-performance BMP.

Erosion Eels should not be viewed as a replacement for good site evaluation. They still must be matched to the drainage area, slope, flow condition, sediment loading, and project specification. However, when the application requires a durable, weighted, high-performance sediment control system, Erosion Eels represent one of the more specialized tools available within the perimeter control and sediment tube category.

This chapter examines how Erosion Eels function, where they are commonly used, how they compare to traditional sediment tubes, and why they have developed a strong reputation among contractors, inspectors, and erosion control professionals working in demanding field conditions.

8.1 What Is an Erosion Eel?

An Erosion Eel is a weighted sediment control BMP made with a durable outer containment system surrounding engineered filtering media. It is designed to slow runoff, encourage sediment deposition, provide filtration, interrupt slope length, and help stabilize areas where water movement is more demanding.

Unlike many traditional straw wattles or standard sediment tubes, Erosion Eels are built for repeated exposure to runoff, sediment loading, and field abuse. Their weight and construction help them stay in place, maintain shape, and continue functioning where lighter products may move, flatten, or require frequent replacement.

Erosion Eels are commonly used for perimeter control, slope interruption, ditch checks, inlet protection, construction entrances, and other applications where durability and reduced maintenance are important. They are not a substitute for proper site evaluation, but they can provide a strong option when the project requires a higher-performance sediment control product.

The key difference is durability. An Erosion Eel is not simply another tube on the ground. It is a more robust sediment control system designed for tougher field conditions.

8.2 Why Erosion Eels Were Developed

Erosion Eels were developed to address several recurring problems found with traditional sediment barriers.

Many straw wattles, filter socks, and standard sediment tubes perform well in light-duty applications, but they can struggle when exposed to repeated runoff, heavy sediment loading, equipment traffic, or longer project durations. Over time, lighter products may flatten, shift, degrade, lose shape, or require frequent maintenance after storm events.

These problems create real costs in the field. A product that must be reset after every rain, replaced multiple times during a project, or constantly repaired by the crew may no longer be the economical choice, even if its initial price was lower.

Erosion Eels were designed to provide a more durable and reliable alternative. Their weight, construction, and engineered media help them resist movement, maintain shape, and continue functioning in conditions where lighter products may struggle.

The purpose is not simply to create a stronger sediment tube. The purpose is to reduce repeated failure points, reduce maintenance demands, and provide a more dependable BMP for demanding applications.

8.3 Hydraulic Performance

One of the primary advantages of Erosion Eels is their hydraulic behavior.

Like other sediment control BMPs, they are designed to slow runoff and encourage sediment deposition. The difference is that Erosion Eels are built to maintain performance under more demanding conditions. Their weight and construction help them resist displacement while allowing water to move through or around the system in a more controlled way.

This controlled hydraulic response is important. When runoff reaches the BMP, the goal is not to stop the water completely. The goal is to reduce velocity, lower the energy of the flow, and create conditions where sediment can settle before water continues downstream.

Erosion Eels are often effective where runoff volumes, velocities, or maintenance demands exceed what lighter products can comfortably manage. They can provide a more stable option for slope interruption, perimeter control, ditch checks, construction entrances, and other locations where durability and resistance to movement matter.

As with every BMP, performance still depends on proper application. An Erosion Eel should be matched to the drainage area, flow condition, slope, sediment loading, and project specification. Its hydraulic advantage comes from using the right product in the right location, not from ignoring the limits of the site.

8.4 Durability Advantages

Durability is one of the defining characteristics of Erosion Eels.

Compared to many traditional sediment tubes, Erosion Eels are designed to maintain their shape, structure, and performance over a longer period of use. That matters on projects where BMPs are exposed to repeated storm events, equipment activity, sunlight, sediment loading, and ongoing site disturbance.

Lighter products may flatten, tear, shift, degrade, or lose effectiveness over time. When that happens, crews must spend additional labor resetting, replacing, or repairing the BMP. On a longer-duration project, those maintenance costs can become significant.

Erosion Eels are often selected because they provide greater structural integrity, improved resistance to repeated loading, better durability in exposed conditions, and reduced replacement frequency. For contractors, this can mean fewer return trips and less repair work. For inspectors and owners, it can mean a more reliable BMP that remains functional between storm events.

The value of durability is best understood over the full life of the project. A product that lasts longer and requires less maintenance may reduce lifecycle cost even if the initial purchase price is higher.

8.5 Perimeter Control Applications

Erosion Eels can be used as perimeter controls in many locations where filter sock or wattles might traditionally be considered.

They are commonly used on commercial developments, utility projects, transportation work, industrial sites, and environmentally sensitive areas where durability and reduced maintenance are important. Their weight helps them stay in place, while their flexible shape allows them to maintain ground contact across uneven surfaces.

This combination makes them useful along disturbed perimeters, temporary work zones, downslope edges, and areas where repeated runoff exposure may cause lighter products to move or degrade. They can be especially valuable where crews want a sediment control product that is faster to deploy than traditional fence and more durable than standard wattles or light-duty sediment tubes.

As with any perimeter control, Erosion Eels should still be matched to the site conditions. Drainage area, slope, flow path, sediment loading, access, and maintenance expectations all matter. Their strength is not that they eliminate site evaluation. Their strength is that, when properly applied, they provide a more durable perimeter control option for demanding field conditions.

8.6 Slope Interruption Applications

One of the most effective uses of Erosion Eels is slope interruption.

As runoff travels downslope, it gains velocity and erosive energy. Installing Erosion Eels across the slope helps break that slope into shorter segments, slowing water before it becomes powerful enough to create rills, carry large sediment loads, or overload the perimeter controls below.

Compared to lighter products, Erosion Eels can provide additional stability and durability on longer or more demanding slopes. Their weight helps resist movement, while their construction allows them to maintain shape through repeated runoff events.

They are often useful where straw wattles may move, flatten, or require frequent replacement, or where filter sock may need additional anchoring to remain in place.

The purpose is the same as other slope interruption BMPs: slow the water early, reduce sediment movement, and prevent erosion problems from building momentum as runoff travels downslope.

8.7 Check Dam Applications

Unlike many perimeter controls, Erosion Eels can perform well in temporary channels, swales, and ditch applications when properly selected and installed.

In these locations, runoff has usually moved beyond sheet flow and entered a more concentrated path. That means the BMP must manage greater depth, velocity, and energy than a typical slope interruption product. The weight and durability of Erosion Eels can provide an advantage in these conditions.

Common uses include temporary ditch checks, swales, diversion channels, construction drainage paths, and other low to moderate concentrated flow areas. In these applications, the goal is to slow water, reduce channel velocity, encourage sediment deposition, and limit erosion within the flow path.

This does not mean every ditch or swale is appropriate for an Erosion Eel. Flow depth, channel slope, drainage area, storm intensity, spacing, anchoring, and project specifications still matter. High-energy channels may require rock check dams, engineered channel protection, turf reinforcement, riprap, or another designed solution.

The value of Erosion Eels in check dam applications is that they can provide a durable, weighted, and maintainable option where lighter products may move, deform, or fail under repeated runoff exposure.

8.8 Comparing Erosion Eels to Other Systems

Erosion Eels occupy a unique position because they combine several advantages found in other sediment control products while improving durability and stability in demanding applications.

Compared to straw wattles, Erosion Eels typically provide greater longevity, better resistance to movement, and improved performance under repeated runoff exposure. Wattles remain economical and useful for many slope applications, but they are lighter and often depend more heavily on staking and maintenance.

Compared to traditional filter sock, Erosion Eels generally provide greater structural stability and reduced deformation. Filter sock is flexible, versatile, and efficient, but some products can flatten, shift, or lose shape over time depending on media type, runoff conditions, and project duration.

Compared to standard sediment tubes, Erosion Eels are often more durable and better suited for applications where runoff velocity, sediment loading, or maintenance demands are higher. Their weight and construction help them resist displacement and maintain function where lighter systems may struggle.

The purpose of this comparison is not to suggest that Erosion Eels are always the right choice. Straw wattles, filter sock, and standard sediment tubes all have appropriate applications. The value of Erosion Eels is that they provide a higher-performance option when durability, stability, service life, and reduced maintenance justify the upgrade.

8.9 Maintenance Considerations

Erosion Eels are designed to reduce maintenance, but they are not maintenance free.

Like any sediment control BMP, they should be inspected after storm events and throughout the life of the project. The main items to watch are sediment buildup, equipment damage, loss of ground contact, displacement, and breaks in system continuity.

Sediment accumulation is expected. In many cases, it means the BMP is doing its job. However, if too much sediment builds up, the system can lose storage capacity and water may begin bypassing or overtopping the control.

Equipment damage should also be monitored. Even durable products can be damaged by grading equipment, trucks, loaders, or repeated construction traffic. If an Erosion Eel is torn, displaced, flattened, or separated from adjacent sections, it should be repaired, reset, or replaced as needed.
Ground contact remains important. If water can pass underneath the BMP, performance is reduced regardless of product quality. The system should remain tight to the ground and continuous across the protected area.

The maintenance advantage of Erosion Eels is not that they eliminate inspection. It is that, when properly selected and installed, they often require less frequent repair or replacement than lighter sediment control products.

8.10 The High-Performance BMP Category

Erosion Eels illustrate an important trend within the erosion control industry.

Many contractors are moving beyond the question, "What is the cheapest BMP?" and beginning to ask a better question: "Which BMP provides the best overall performance for this application?"

That shift matters. As projects become larger, schedules become tighter, and compliance expectations increase, the true cost of a BMP includes more than the purchase price. Installation labor, maintenance frequency, repair work, replacement cost, inspection risk, and project delays all affect total value.

High-performance BMPs are often selected when a standard product may not provide enough durability, stability, or service life for the conditions. Erosion Eels are a good example because they are designed to reduce movement, maintain shape, handle repeated runoff exposure, and reduce maintenance in more demanding applications.
This does not mean every project needs a high-performance product. Many sites can be managed effectively with standard wattles, filter sock, or silt fence. The point is that more demanding conditions often require a more durable solution.

The best BMP is not always the cheapest product on the front end. It is the product that provides the best balance of performance, cost, labor, maintenance, durability, and risk reduction over the life of the project.

Chapter Summary

There are many products that can function as sediment barriers, but few have developed the field reputation that Erosion Eels have among contractors, inspectors, and erosion control professionals who routinely deal with difficult site conditions.

The reason is not appearance. From a distance, an Erosion Eel may look like another sediment tube placed on the ground. The difference is performance. Erosion Eels are designed to provide greater durability, hydraulic stability, service life, and resistance to movement than many lighter sediment control products.

Throughout this chapter, we examined how Erosion Eels function as perimeter controls, slope interruption devices, ditch checks, and high-performance sediment barriers. Their value becomes especially clear in applications where standard wattles, filter sock, or lightweight sediment tubes may move, flatten, degrade, or require frequent repair after storm events.

The TerrainIQ approach begins by asking whether standard sediment barriers are adequate for the site conditions. If runoff volume, velocity, project duration, maintenance access, or sediment loading creates higher risk, a more durable BMP may be justified. The goal is not to choose the most expensive product. The goal is to select the solution that provides the best balance of performance, cost, labor, maintenance, durability, and risk reduction. Erosion Eels demonstrate an important principle that applies throughout erosion control: products gain acceptance when they consistently solve problems in the field. The most economical BMP is not always the least expensive product at purchase. It is often the product that performs reliably, reduces maintenance, and protects the project over its full service life.

CHAPTER 9 - Specialty Perimeter Control Systems

Restoration, Reuse, Hard Surfaces, and Sensitive Areas

Not every erosion control challenge can be solved with silt fence, filter sock, straw wattles, or standard sediment tubes.

As projects become larger, more complex, longer in duration, environmentally sensitive, or subject to unique site constraints, specialty perimeter control products often become necessary. These systems are typically designed to address specific hydraulic, environmental, installation, traffic, reuse, or maintenance concerns that traditional perimeter controls may not adequately manage.

Some specialty products use natural materials such as coir, excelsior, compost, or mulch. Others use synthetic or reusable materials designed for durability, hard surface installation, vehicle traffic, reduced waste, or repeated use across multiple projects. Products such as DuraWattle fit into this category because they are not simply another straw wattle or filter sock. They are designed to solve a different set of field problems.

Many specialty perimeter controls have existed for decades, while others represent newer technologies responding to evolving regulatory requirements, sustainability goals, labor constraints, and field performance expectations.

Understanding specialty perimeter controls helps erosion control professionals expand their toolbox and select solutions that best fit the unique demands of each project. The goal is not to use a specialty product everywhere. The goal is to recognize when a standard BMP is not the best fit and when a more specialized system provides better value.

9.1 Coir Logs

Coir logs are cylindrical erosion control devices manufactured from coconut fiber. The fibers are compressed within a containment netting and formed into a dense, durable log capable of providing both erosion protection and sediment control.

Coir products are widely used because coconut fiber is naturally resistant to water and slow to break down. This durability comes in part from the way coconut fiber performs through repeated wet and dry cycles. In applications where other organic materials may deteriorate more quickly, coir can maintain structure and function for a longer period of time.

This makes coir logs especially valuable in applications where longer-term stabilization is needed. They are commonly used along streambanks, shorelines, wetlands, slopes, channels, and other sensitive areas where erosion protection, natural appearance, environmental compatibility, and vegetation establishment are important.

Unlike many temporary BMPs, coir logs are often intended to support a transition from temporary stabilization to permanent vegetation. As vegetation grows through and around the log, the coir provides protection while the root system becomes established.

The primary advantages of coir logs are durability, water resistance, long service life, natural appearance, and environmental compatibility. Their limitations are typically cost, weight, handling, and installation effort. Coir logs are usually more expensive than straw wattles or standard sediment tubes, but they can be a better fit when the project requires longer performance, frequent wetting and drying, or restoration-oriented stabilization.

9.2 Advantages and Limitations of Coir Logs

Coir logs are often selected when the project objective extends beyond simple temporary sediment control.

Their greatest advantage is durability. Because coconut fiber resists breakdown through repeated wet and dry cycles, coir logs can remain functional much longer than many temporary organic BMPs. This makes them especially valuable in streambank, shoreline, wetland, channel, and restoration applications where water exposure is frequent and long-term stabilization is needed.

Coir logs also offer strong environmental acceptance. They are made from natural material, blend well into sensitive landscapes, and can support vegetation establishment as roots grow into and around the fiber structure. In many applications, they help provide temporary protection while permanent vegetation becomes established.

The primary limitations are cost, weight, and installation effort. Coir logs are usually more expensive than straw wattles or standard sediment tubes. They are also heavier and slower to install, especially in wet or difficult access areas. For short-term construction perimeter control, they may be more product than the application requires.

The key is matching the product to the goal. If the objective is short-term sediment control on a typical construction site, a straw wattle, filter sock, or other temporary BMP may be more practical. If the objective involves longer-term stabilization, frequent water exposure, vegetation support, or environmentally sensitive work, coir logs can provide strong value.

9.3 Excelsior Logs

Excelsior logs are manufactured from curled wood fibers contained within a tubular netting system. Like excelsior erosion control blankets, these products benefit from the natural resiliency, filtration capability, and water-holding characteristics of wood fiber materials.

Excelsior can provide excellent sediment retention, strong filtration performance, good water absorption, natural appearance, and support for vegetation establishment. The curled fibers create an interlocking structure that helps slow runoff, capture sediment, and maintain shape better than some lighter organic materials.

Historically, excelsior products have been used where longer-term stabilization, environmental performance, and natural materials are important. They can be appropriate for slopes, drainage areas, restoration work, and other applications where a more durable organic fiber product is desired.

The primary challenge is regional availability. As discussed earlier in this module, excelsior production is concentrated largely in western states. For projects east of the Mississippi River, freight costs can make excelsior logs significantly more expensive than straw, compost, wood fiber, or other locally available alternatives.

This does not mean excelsior is a poor product. In many cases, it is an excellent product. The issue is practicality. A material can perform well and still be limited by cost, availability, and supply chain realities. For everyday construction applications in the Southeast, excelsior logs may be less common simply because other materials are easier and more economical to source.

9.4 DuraWattle and Reusable Synthetic Barriers

DuraWattle belongs in the specialty perimeter control category because it is not a traditional straw wattle, compost sock, filter sock, or natural fiber log. It is a reusable synthetic sediment barrier designed to provide durability, traffic tolerance, and reduced waste in applications where standard temporary BMPs may struggle.

DuraWattle uses a sealed polyurethane foam core with an outer UV-stabilized polypropylene filter fabric. The system is designed to compress under vehicle loading and rebound after traffic passes over it. This makes it especially useful in areas where traditional straw wattles, fiber rolls, or sediment tubes may be damaged by repeated vehicle crossings or construction activity. DuraWattle describes the product as a reusable sediment barrier that can be driven over, ships compressed, installs with low maintenance, and is used for hard surface applications as well as soil applications.

Common applications include perimeter control, stockpile management, inlet protection, curb protection, egress points, hard surfaces, and construction site entry and exit areas. In these locations, DuraWattle can help create a continuous sediment control barrier across soil, curb, sidewalk, pavement, or other surfaces where staking, trenching, or traditional wattle installation may be difficult.

One of the major advantages is reusability. Public DuraWattle materials describe a typical service life of 3-5 years in favorable conditions and reuse on many installations. This can reduce replacement frequency, removal labor, and landfill waste compared to temporary products that are discarded after a single project or season.

The product also has practical limits. DuraWattle notes that it is not designed to absorb hydrocarbons or dissolved metals, and additional BMPs may be needed where those pollutants are a concern. Heavy turning, stopping, or pivoting by equipment directly on the product can also reduce reusability. Like every BMP, it must be matched to the flow condition, traffic pattern, slope, drainage area, and project specification.

DuraWattle is best understood as a specialty reusable barrier rather than a replacement for every sediment control product. Its value is strongest where durability, visibility, hard-surface installation, vehicle exposure, reusability, and waste reduction matter. In those conditions, it can provide a practical alternative to disposable wattles, sand bags, curb bags, or other temporary controls that require more frequent replacement.

9.5 Compost Berms

Compost berms are a specialty perimeter control constructed by placing compost directly on the soil surface to form a linear barrier.

Unlike filter sock, compost berms do not use an outer mesh or tubular containment system. The compost itself creates the barrier. When properly placed, the berm can slow runoff, filter sediment, encourage deposition, and provide some organic soil benefit to the area where it is installed.

This can make compost berms attractive in environmentally sensitive applications or projects where users want to avoid synthetic containment materials. They can also be useful where the material may remain on-site and be incorporated into the soil after construction, reducing removal labor and disposal waste.

The challenge is consistency. Because compost berms are built in the field, performance depends heavily on compost quality, particle size, berm dimensions, placement, compaction, and maintenance. If the berm is too loose, too small, poorly placed, or exposed to more runoff than it can manage, water may cut through it or bypass around it.

Compost berms can provide sediment filtration, velocity reduction, pollutant removal, and organic soil enhancement, but they require thoughtful construction and inspection. They are not simply piles of compost placed along the edge of a site. They are field-built BMPs that must be shaped, located, and maintained to function properly.

9.6 Mulch Berms

Mulch berms are commonly used on large linear construction projects and major earthmoving operations where long distances must be protected economically.

Unlike manufactured wattles, filter sock, or sediment tubes, mulch berms are created by placing organic mulch material in continuous rows to intercept runoff, slow water, and encourage sediment deposition. They are often built with locally available mulch or chipped material, which can make them practical for large sites where manufactured products would be expensive or difficult to install over long distances.

Common applications include utility corridors, highway projects, pipeline construction, large grading operations, and remote earthwork areas. In these settings, mulch berms can provide a fast, flexible, and cost-effective method of slowing runoff and reducing sediment movement.

Their advantages are availability, low material cost, rapid installation, and the ability to cover large areas. They can also reduce waste when local clearing material is processed and reused on-site rather than hauled away.

The limitations are consistency and maintenance. Because mulch berms are typically field-built, performance depends on material quality, berm dimensions, placement, slope, runoff volume, and maintenance after storm events. If the berm is too small, poorly placed, or exposed to concentrated flow, water can cut through it or bypass around it.

Mulch berms are simple in concept, but they should still be treated as BMPs. When properly constructed and maintained, they can be highly effective. When treated as random piles of mulch, they rarely perform as intended.

9.7 Living Berms and Vegetative Systems

As environmental regulations and long-term stabilization goals continue evolving, interest in living berms and vegetative perimeter control systems has increased.

These systems use vegetation, soil, compost, mulch, or other natural materials to create a perimeter control that does more than temporarily slow runoff. The goal is to combine sediment control, filtration, stabilization, and long-term environmental benefit in one system.

Common examples include vegetated berms, native grass barriers, permanent buffer strips, biofiltration areas, and stabilized vegetative edges along waterways or sensitive site boundaries. These approaches can be especially valuable on long-term projects, restoration sites, utility corridors, streamside work, wetland edges, and areas adjacent to creeks, rivers, ponds, or drainage channels.

When properly established, vegetative systems help slow runoff, filter sediment, stabilize soil, support infiltration, and reduce erosion at the source. They can also provide habitat value, improve site appearance, and create a more natural transition between disturbed construction areas and protected environmental features.

Their greatest strength is long-term performance. A temporary BMP may degrade or require removal, but a well-established vegetative system can continue functioning after construction is complete. This makes living berms and vegetative buffers especially useful where the project goal includes permanent stabilization rather than short-term sediment control only.

The primary limitation is establishment time. Vegetation must be properly installed, protected, watered if needed, and allowed to develop sufficient root structure. These systems may require temporary support from wattles, coir logs, filter sock, erosion control blankets, or other BMPs until vegetation becomes established.

Living berms and vegetative systems are not appropriate for every project, but they represent an important category of perimeter control technology. They are especially valuable when filtration, stabilization, environmental compatibility, and long-term performance matter as much as temporary sediment containment.

9.8 Emerging Technologies

The erosion control industry continues to evolve as contractors, engineers, inspectors, and owners look for products that improve performance while reducing labor, maintenance, waste, and environmental risk.

Several newer or more specialized products reflect this trend. Siltworm uses kiln-dried inert fill material intended to provide consistent filtration while reducing concerns related to weed seed, disease, bark, or unwanted organic material. DuraWattle uses a reusable synthetic construction that can provide value in hard-surface areas, curb lines, egress points, and traffic-exposed locations where disposable products may wear out quickly. Erosion Eels represent the high-performance sediment tube category, offering greater durability and stability in demanding applications.

Other technologies continue to develop around biodegradable containment systems, recycled material products, compost filter socks, coir wattles, enhanced filtration media, and high-performance natural fibers. Products such as Filtrexx SiltSoxx helped establish compost filter sock as a recognized BMP category, while coir products and biodegradable natural fiber wattles continue to grow in environmentally sensitive and restoration-focused applications. Compost filter socks are commonly promoted for sediment control and pollutant removal, while fiber rolls may be manufactured with straw, coconut fiber, composted material, UV-degradable polypropylene netting, or fully biodegradable materials such as burlap, jute, or coir.

These products show that innovation in erosion control is not limited to one direction. Some technologies focus on better filtration. Others focus on reusability, reduced landfill waste, natural materials, easier removal, improved visibility, faster installation, or reduced risk of introducing unwanted seed or invasive species.

As environmental expectations continue increasing, these specialty systems will likely play a larger role in BMP selection. The best approach is not to chase every new product, but to understand what problem each technology is trying to solve and whether that solution fits the project conditions.

9.9 Selecting Specialty BMPs

Specialty perimeter controls are usually selected when the site conditions or project goals extend beyond ordinary temporary sediment control.

These products are often considered for sensitive environmental areas, stream restoration, wetland mitigation, shoreline protection, long-term stabilization, hard-surface applications, traffic-exposed areas, or projects with unique regulatory requirements. In these situations, the BMP may need to provide more than basic sediment containment. It may need to support vegetation, remain stable through wet and dry cycles, reduce waste, tolerate traffic, blend into a natural environment, or remain in place longer than a typical construction BMP.

The decision usually requires balancing performance, cost, environmental compatibility, installation effort, longevity, maintenance, and project specifications. A coir log may be the right choice for a streambank or wetland edge but excessive for a short-term commercial construction perimeter. A DuraWattle may be useful at a paved egress point or curb line but unnecessary on a remote slope. A compost berm may be attractive where synthetic containment is undesirable, but it requires proper material quality and field construction.

No single specialty BMP is appropriate for every situation. The best choice is the one that solves the specific problem without creating unnecessary cost, labor, disposal, or regulatory concerns.

The TerrainIQ approach is to identify the project objective first. If the goal is temporary perimeter control, a standard BMP may be enough. If the goal includes long-term stabilization, environmental restoration, reusability, visibility, traffic tolerance, or reduced waste, a specialty BMP may provide better total value.

Chapter Summary

One of the most important lessons in erosion control is recognizing that products exist because specific problems exist.

Coir logs, excelsior logs, compost berms, mulch berms, DuraWattle, living berms, and vegetative systems all developed because traditional perimeter controls could not effectively address every application. Some projects require longer service life. Others require environmental compatibility, vegetation support, traffic tolerance, reduced waste, hard-surface installation, or performance in areas exposed to repeated wet and dry cycles.

Throughout this chapter, we examined specialty perimeter controls that extend beyond standard silt fence, straw wattles, filter sock, and sediment tubes. Coir logs are widely used for long-term stabilization and restoration work because coconut fiber resists breakdown and performs well in wet environments. Excelsior logs offer strong filtration and vegetation support, although regional availability can affect cost. Compost and mulch berms provide field-built solutions for large or environmentally sensitive sites. DuraWattle demonstrates how reusable synthetic barriers can solve hard-surface, egress, and traffic-exposed sediment control problems. Living berms and vegetative systems show how perimeter controls can support both filtration and long-term stabilization.

The TerrainIQ approach begins by asking whether a traditional BMP can solve the problem. If not, the next step is to evaluate environmental sensitivity, project duration, regulatory expectations, long-term stabilization goals, traffic exposure, installation conditions, maintenance needs, and disposal requirements. The best specialty BMP is not always the most advanced product. It is the product that best aligns with the project objective.

Specialty perimeter controls are not intended for every site. They become valuable when the application requires something more specific than basic temporary sediment containment. The best erosion control professionals understand not only how products work, but why they were developed in the first place.

CHAPTER 10 - Construction Entrances and Tracking Control

Stabilized Access, Aggregate, Geotextile, and Tracking Reduction

One of the most visible forms of sediment pollution occurs before stormwater ever leaves a construction site.

Every day, construction vehicles enter and exit active project sites carrying mud, soil, and sediment on their tires, tracks, and undercarriages. Without proper controls, that material is deposited onto public roads, parking areas, sidewalks, and adjacent properties. Once sediment reaches these surfaces, it can create safety concerns, generate public complaints, clog drainage systems, and eventually wash into nearby waterways during rainfall. This process is commonly referred to as tracking.

Construction entrances are designed to reduce that problem before it leaves the site. While they are often overlooked compared to perimeter controls, sediment basins, or slope stabilization measures, construction entrances serve a critical role in preventing off-site sediment migration. They are one of the most practical and visible BMPs on an active construction project.

A well-designed and properly maintained entrance helps remove sediment from vehicles before they reach the roadway. It also helps define access points, improve site organization, reduce cleanup costs, and support regulatory compliance.

The goal is simple: keep sediment on the project site rather than allowing it to be tracked into the public right-of-way. Like every BMP discussed in this module, construction entrances are most effective when they are properly designed, installed, maintained, and supported by the right companion controls.

10.1 What Is a Construction Entrance?

A construction entrance is a stabilized access point designed to reduce the amount of sediment transported from a construction site onto adjacent roadways.

Most construction entrances consist of aggregate placed over a geotextile separation fabric. The aggregate creates a stable driving surface and helps dislodge mud and sediment from vehicle tires as trucks and equipment leave the site. The geotextile below the stone helps separate the aggregate from the underlying soil and prevents the entrance from sinking into the subgrade.

A construction entrance should also have defined dimensions, a clear access route, and a maintenance plan. The entrance must be long enough, wide enough, and deep enough to provide meaningful contact between vehicle tires and the aggregate surface.

The objective is simple. As vehicles travel across the aggregate surface, mud and sediment are dislodged before the vehicle reaches the public roadway. The better the entrance is designed and maintained, the less sediment is tracked off-site.

10.2 Why Tracking Matters

Many contractors focus primarily on stormwater runoff, but sediment transported by vehicles can create significant environmental, operational, and public safety concerns.

Tracked sediment can make roadways slippery, create dust, clog storm drains, trigger complaints, and draw attention from inspectors, municipalities, property owners, and the public. Once sediment reaches pavement, rainfall can quickly carry it into curb inlets, storm sewer systems, ditches, streams, and other receiving waters.

Tracking also creates a perception problem. A muddy entrance and sediment-covered roadway often make a site appear poorly managed, even if other BMPs are functioning properly. For inspectors and neighbors, tracked sediment is one of the most visible signs that a project may not be controlling erosion and sediment effectively.

Preventing tracking at the source is generally more effective than cleaning it up after it leaves the site. Street sweeping, washing, and manual cleanup may still be necessary, but those activities should support the entrance BMP rather than replace it.

10.3 The Role of Aggregate

Aggregate serves as the working surface of most construction entrances.

The stone provides stable access, reduces rutting, improves traffic flow, and helps remove mud from tires and tracks before vehicles leave the site. As vehicles travel across the entrance, the aggregate surface creates friction and vibration that help dislodge sediment.

Aggregate size, depth, cleanliness, and angularity all influence performance. If the stone is too small, too shallow, or clogged with sediment, it loses effectiveness. If the aggregate becomes embedded into the subgrade, the entrance may begin functioning more like a muddy driveway than a stabilized BMP.

Proper aggregate selection is one of the most important parts of entrance design. The goal is not simply to place stone at the access point. The goal is to create a durable driving surface that removes sediment, supports traffic, drains properly, and can be maintained throughout construction.

10.4 The Importance of Geotextile

The geotextile beneath a construction entrance is easy to overlook, but it often determines whether the entrance performs for weeks or months.

Without geotextile separation fabric, aggregate can become embedded into the underlying soil. As the stone sinks into the subgrade, the entrance loses thickness, stability, and cleaning ability. This increases maintenance demands and often leads to repeated stone replacement.

Geotextile helps separate the aggregate from the soil below. It improves stability, reduces aggregate loss, extends service life, and improves constructability in soft or wet conditions. In many ways, it allows the aggregate to keep doing its job instead of disappearing into the mud.

From a contractor's perspective, skipping geotextile may appear to save money at installation. In reality, it often increases maintenance cost and shortens the useful life of the entrance. A properly installed separation layer is one of the simplest ways to improve construction entrance performance.

10.5 Construction Entrance Dimensions

Most construction entrance standards establish minimum dimensions for a reason.

An entrance must be long enough for vehicle tires to rotate across the aggregate surface several times before reaching the roadway. It must be wide enough to handle site traffic without encouraging drivers to bypass the stabilized area. It must be deep enough to support vehicles and maintain separation from the underlying soil.

Entrance dimensions should consider traffic volume, vehicle type, turning movements, available space, soil conditions, and project duration. A small residential site may require a simpler entrance than a large commercial, industrial, utility, or highway project with heavy truck traffic.

Larger projects often require more substantial entrances because they generate more traffic and more sediment. If the entrance is too short, too narrow, too shallow, or poorly located, vehicles will track sediment even if stone is present.

The entrance should be designed around how the site will actually be used, not just the minimum detail shown on a plan.

10.6 Perimeter Controls Around Construction Entrances

One of the most common mistakes in erosion control is treating the construction entrance as an isolated BMP.

In reality, entrances often need companion controls to prevent runoff and sediment from bypassing the aggregate surface. Water may approach the entrance from adjacent disturbed areas, flow along the edge of the access road, or collect near low points where sediment can escape around the stabilized entrance.

Filter sock, Erosion Eels, silt fence, sediment tubes, DuraWattle, diversion berms, and other controls may be used to help direct runoff, protect the entrance edges, and reduce sediment movement around the access point. These products help contain runoff and encourage traffic to remain on the stabilized entrance rather than driving around it.

This is especially important where the entrance ties into pavement, curb, sidewalk, or other hard surfaces. Specialty products such as DuraWattle may be useful around curb lines, egress points, paved transitions, and areas exposed to vehicle traffic where a reusable and traffic-tolerant barrier provides advantages over disposable products.

A good construction entrance is not just a pile of stone. It is part of a larger tracking control system that includes access management, perimeter protection, runoff control, and maintenance.

10.7 Filter Sock Applications at Entrances

Filter sock is frequently used near construction entrances because it installs quickly, conforms well to uneven ground, and provides effective sediment containment around access points.

At entrances, filter sock may be used along the sides of the stabilized entrance, near low areas, around adjacent disturbed soil, or in locations where runoff needs to be slowed before reaching pavement. It can help reduce sediment movement around the entrance and support the overall tracking control strategy.

The main advantages are flexibility and ground contact. Filter sock can be placed quickly, adjusted as conditions change, and staked where needed to prevent movement. Depending on the media type, it may also provide filtration benefits and end-of-project disposal advantages.

As with any BMP, filter sock must be maintained. If it becomes displaced, overloaded, damaged, or buried in sediment, it should be reset, cleaned out, or replaced.

10.8 Erosion Eel Applications at Entrances

Erosion Eels have gained popularity around construction entrances because of their durability, weight, structural stability, and resistance to movement. In areas where runoff, sediment, and equipment activity create heavy field demands, Erosion Eels can provide a stronger and longer-lasting option than lighter sediment control products.

They may be used along entrance edges, near drainage paths, around disturbed access areas, or in locations where repeated storm exposure would cause lighter products to shift or degrade. For longer-duration projects, their durability can reduce maintenance and replacement frequency.

DuraWattle can also be useful in construction entrance applications, especially where hard surfaces, curb lines, paved egress points, sidewalks, or vehicle crossings are involved. Because it is designed as a reusable synthetic barrier with traffic-tolerant characteristics, it may provide value where disposable wattles or sediment tubes are likely to be damaged by repeated vehicle movement.

Neither Erosion Eels nor DuraWattle replace the need for a properly designed stabilized entrance. Instead, they can serve as companion BMPs that improve edge control, protect transitions, reduce bypass, and support tracking control in areas where traditional products may not be durable enough.

10.9 Combining Multiple BMPs

The most effective construction entrances often combine multiple BMPs.

A stabilized aggregate entrance may remove sediment from tires, but it may not fully control runoff approaching from the sides. Filter sock may protect the edges. Erosion Eels may reinforce areas exposed to repeated runoff or equipment activity. DuraWattle may help at hard-surface transitions or traffic-exposed egress points. A diversion berm may be needed to direct clean water away from the entrance or prevent muddy runoff from leaving the site.

This treatment-train approach generally performs better than relying on a single BMP. Each control has a specific job. The aggregate stabilizes traffic. The geotextile supports the aggregate. The companion perimeter controls manage runoff and sediment around the entrance. Maintenance keeps the system functioning.

When these pieces work together, the entrance becomes more than an access point. It becomes a sediment control system.

10.10 Common Construction Entrance Failures

Several construction entrance problems appear repeatedly on active projects.

One of the most common is insufficient length. If vehicles do not travel far enough across the aggregate, there may not be enough tire contact to remove mud and sediment before reaching the roadway.

Lack of maintenance is another major issue. Over time, aggregate becomes clogged with sediment. When the voids fill with mud, the entrance loses its ability to clean tires and may need to be refreshed, cleaned, or supplemented with additional stone.

Missing geotextile can also create failure. Without separation fabric, aggregate can sink into the subgrade, reducing entrance thickness and stability. This leads to more rutting, more mud, and more frequent stone replacement. Traffic bypass is another common problem. If drivers avoid the stabilized entrance because it is poorly located, too narrow, blocked, or inconvenient, the BMP cannot perform. Access control is part of erosion control.

Poor drainage can also reduce performance. If water ponds within the entrance, sediment can accumulate, aggregate can become embedded, and vehicles may track mud even after crossing the stone.

Understanding these failure mechanisms helps improve performance and reduce maintenance cost. A construction entrance must be designed, installed, used, and maintained as an active BMP rather than a one-time stone placement.

Chapter Summary

Many contractors view construction entrances as a regulatory requirement. Experienced erosion control professionals view them as one of the most cost-effective BMPs on the entire project.

A properly designed and maintained entrance prevents sediment problems before they occur. Once sediment reaches public roads, cleanup costs, complaints, safety concerns, inspection issues, and compliance risks increase quickly. The best sediment is the sediment that never leaves the site.

Throughout this chapter, we learned that aggregate and geotextile work together to create a stable access point. The aggregate provides the working surface that dislodges sediment from tires, while the geotextile keeps the stone separated from the subgrade and extends the service life of the entrance.

We also learned that construction entrances perform best when they are supported by companion BMPs. Filter sock, Erosion Eels, DuraWattle, silt fence, sediment tubes, diversion berms, and other controls can help manage runoff, protect entrance edges, prevent bypass, and support tracking control around access points.

The TerrainIQ approach begins by identifying all site access points, estimating traffic volume, evaluating subgrade conditions, determining aggregate and geotextile requirements, reviewing perimeter control needs, and establishing maintenance expectations. The goal is not simply to install an entrance. The goal is to create a working sediment control system that keeps vehicles, runoff, and sediment moving in the right way.

Construction entrances are one of the first lines of defense against off-site sediment migration. When properly designed, properly located, and properly maintained, they reduce tracking, protect roadways, support compliance, and prevent sediment from becoming someone else's problem.

CHAPTER 11 - Installation Methods, Inspection, and Maintenance

Anchoring, Trenching, Inspections, Repairs, and Replacement

Even the best perimeter control product will fail if it is installed improperly or neglected after installation.

Many BMP failures are blamed on product quality when the real cause is installation, inspection, or maintenance. In most cases, perimeter controls are relatively simple systems. Their success depends on whether they are placed correctly, anchored properly, kept in contact with the ground, inspected after storms, and maintained throughout the life of the project.

This chapter focuses on the practical details that often determine BMP performance: stakes, posts, pins, anchors, trenching, keying, terminations, inspections, sediment removal, repairs, and replacement. These details may appear small, but they often decide whether a BMP performs as intended or becomes a recurring maintenance problem.

11.1 Wooden Stakes
Wood stakes remain one of the most common anchoring methods in erosion control.

They are widely used with straw wattles, silt fence, coir logs, excelsior logs, and certain sediment tube systems. Their advantages are simple: they are readily available, economical, easy to install, and biodegradable.

The performance of a wood stake depends on its size, length, installation depth, and the soil conditions around it. A stake driven into firm soil can provide strong support. A stake driven shallow into soft, saturated, or loose soil may provide very little holding power.

Wood stakes are often the most practical choice for temporary erosion control, but they still require proper installation. The stake must be long enough and driven deep enough to resist movement during runoff events. If the stake pulls loose, the BMP can shift, roll, float, or lose contact with the ground.

11.2 Steel T-Posts
Steel T-posts provide greater structural support than wood stakes and are commonly used in higher-demand applications.

Typical uses include wire-backed silt fence, commercial wire-back systems, reinforced sediment barriers, and other high-load perimeter controls. Compared to wood stakes, T-posts provide greater strength, improved durability, and better resistance to loading from sediment and runoff.

The tradeoff is cost and installation effort. T-posts are more expensive, require more effort to install, and must usually be removed at the end of the project. They may also increase closeout labor compared to wood stakes or systems designed for easier removal.

T-posts are frequently selected when project duration is longer, runoff loading is higher, or specifications require additional structural support. Like any anchoring method, they only perform well when installed at the correct spacing, depth, and alignment.

11.3 Pins, Staples, and Anchors
Pins, staples, and anchors are used throughout erosion control to hold BMPs in place and maintain contact with the ground.

Common examples include steel staples, J-pins, rebar pins, anchor stakes, sod staples, and other specialty fastening systems. These products are often used with erosion control blankets, turf reinforcement mats, wattles, filter sock, coir products, and other surface-applied BMPs.
The correct anchor depends on the product, slope, soil condition, runoff volume, and expected hydraulic loading. A light-duty staple may be adequate on a mild slope with firm soil. A steeper slope, loose subgrade, or higher-flow condition may require longer pins, stronger anchors, or closer spacing.

Anchor selection is not just a material decision. It is a performance decision. If the anchor does not hold, the BMP will not stay where it is needed.

11.4 Trenching and Keying

Many perimeter control systems require some form of embedment or seating into the soil.

Trenching and keying are most commonly associated with silt fence, where the bottom of the fabric must be embedded to prevent undercutting. If the fabric is simply placed on top of the ground, runoff can pass beneath it and carry sediment off-site while the fence still appears upright.

The purpose of trenching is to force water to encounter the BMP rather than flow under it. Proper embedment improves stability, reduces bypass, and increases overall effectiveness.

Other BMPs may not require trenching in the same way, but they still require good ground contact. Wattles, filter sock, Erosion Eels, and coir logs may need to be seated into a shallow depression or placed firmly against the soil surface so runoff cannot pass underneath. The principle is the same: water should meet the BMP, not escape beneath it.

11.5 Proper Terminations

BMPs rarely fail only in the middle. Many failures occur at the ends.

A perimeter control may be properly installed for hundreds of feet, but if runoff can flow around the last section, the entire system can be bypassed. Proper terminations help prevent water from escaping around the ends of the BMP.

Common termination methods include J-hooks, return ends, turn-ups, and tie-ins to stable features such as slopes, berms, pavement, curbs, or existing structures. The purpose is to keep runoff from traveling along the BMP and exiting around the end.

J-hooks are especially useful with silt fence, filter sock, wattles, and sediment tubes because they turn the end of the BMP uphill and create a small area where runoff can slow, pond, and drop sediment. The shape matters because it manages water. It is not simply an installation detail for appearance.

Good terminations often determine whether a perimeter control functions as a complete system or fails at the easiest escape point.

11.6 Inspection Requirements

Inspection is one of the most important parts of erosion control management.

Most regulatory programs require periodic inspections throughout construction, especially after rainfall events. The purpose is to identify problems early before they become failures.

Inspections should evaluate whether BMPs are damaged, displaced, overloaded, bypassed, undermined, or no longer functioning as intended. Inspectors should also look for sediment accumulation, loss of ground contact, overtopping, undercutting, failed terminations, clogged entrances, and evidence that runoff has changed direction as construction progresses.

Inspection is not just a compliance exercise. It is a maintenance planning tool. A good inspection tells the contractor what needs to be repaired, reset, cleaned, replaced, or upgraded before the next storm.

11.7 Maintenance Procedures

Perimeter controls should be viewed as active systems, not one-time installations.

Maintenance may include removing sediment, repairing damaged sections, resetting displaced BMPs, re-establishing ground contact, replacing stakes or anchors, restoring terminations, refreshing aggregate entrances, or replacing products that have reached the end of their useful life.

The need for maintenance does not mean the BMP failed. In many cases, sediment accumulation means the BMP is doing its job. However, if that sediment is not removed when needed, storage capacity decreases and failure risk increases.

The best erosion control programs plan for maintenance from the beginning. A BMP that cannot be accessed, inspected, or maintained is unlikely to perform well for the duration of the project.

11.8 Sediment Removal

Sediment removal is one of the most common maintenance activities.

As sediment accumulates behind a BMP, the system gradually loses capacity. Water may begin ponding higher than expected, bypassing around the ends, flowing over the top, or cutting beneath the product.

Timely sediment removal helps restore capacity and extend service life. This applies to silt fence, filter sock, wattles, Erosion Eels, inlet protection, construction entrances, sediment traps, and many other BMPs.

Sediment should be removed and placed in a stable location where it will not wash back into the drainage system. Removing sediment from one location only to leave it exposed nearby defeats the purpose of the maintenance activity.

11.9 Repair Procedures

Even properly selected and installed BMPs occasionally require repairs.

Storm events, equipment activity, grading changes, sediment loading, and normal wear can damage perimeter controls. Common repairs include replacing torn fabric, resetting displaced products, reinstalling stakes or anchors, reconnecting separated sections, restoring J-hooks or turn-ups, and rebuilding areas where runoff has bypassed the system.

Prompt repair is important because small problems rarely stay small. A minor gap, loose stake, displaced wattle, or damaged section of filter sock can become a major failure during the next rain event.

Good maintenance crews understand that erosion control repair is not cleanup after failure. It is prevention before the next storm.

11.10 Replacement Criteria
Eventually, every BMP reaches the end of its useful life.

Replacement may be necessary when a product is damaged beyond repair, degraded by sunlight, overloaded with sediment, flattened, torn, displaced, clogged, or no longer able to maintain ground contact. Project duration also matters. A BMP intended for short-term use may not remain effective on a long-duration project without replacement.

Knowing when to repair and when to replace is an important part of BMP management. Repair may be appropriate when the product remains structurally sound and only a localized issue exists. Replacement is usually the better choice when the product has lost shape, strength, continuity, or function.

The decision should be based on performance, not appearance alone. If the BMP can no longer manage water and sediment as intended, it should be replaced.

Chapter Summary
Many contractors spend significant time selecting products and far less time planning installation, inspection, and maintenance. In reality, these factors often determine whether a BMP succeeds or fails.

A properly maintained BMP made from average materials will often outperform a neglected BMP made from premium materials. Installation quality, anchoring, trenching, ground contact, terminations, inspection frequency, sediment removal, repair timing, and replacement decisions all influence performance.

The TerrainIQ approach begins by verifying installation quality, inspecting regularly, identifying deficiencies early, performing maintenance promptly, repairing when practical, and replacing BMPs when necessary. The process is simple, but it requires discipline.

The best erosion control professionals understand that BMPs are not static products. They are active systems exposed to changing site conditions, rainfall, runoff, sediment loading, equipment activity, and construction sequencing. They must be managed throughout the life of the project.
The most important lesson from this chapter is straightforward: the best BMP in the world cannot perform if it is not installed correctly and maintained properly.

CHAPTER 12 - TerrainIQ Field Decision Framework
Water First, Products Last

Throughout this module, we have examined a wide range of perimeter control products and technologies.

We have discussed silt fence, wire-backed systems, advanced sediment barriers, sediment tubes, straw wattles, filter sock, Siltworm, Erosion Eels, coir logs, compost berms, mulch berms, DuraWattle, construction entrances, and other specialty BMPs. Each product has a role, and each can provide value when used in the proper application.

But product knowledge alone is not enough.

Experienced erosion control professionals know that successful BMP selection begins long before a product is chosen. It begins with understanding the site. It begins with observing how water moves, where sediment is generated, how runoff concentrates, what slopes are present, what regulations apply, and how the project will change over time.

The objective is not simply to select a product. The objective is to understand the problem before selecting the solution.

This final chapter brings the module together by organizing the decision-making process into a practical field framework. This is the TerrainIQ approach to perimeter control selection.

12.1 The First Principle of Erosion Control

Before evaluating products, ask two questions:

Where is the water coming from?

Where is it going?

Nearly every erosion control decision becomes easier once these questions are answered. Water movement determines sediment movement. Sediment movement determines risk. Risk determines which BMPs are appropriate.

If runoff is shallow, slow, and distributed, one group of products may work well. If runoff is concentrated, fast, or carrying heavy sediment, a different approach may be required. If water is entering from off-site, crossing a slope, leaving through a construction entrance, or collecting in a ditch, the BMP must match that condition.
This is the first principle of erosion control: understand the water before choosing the product.

12.2 Sheet Flow vs Concentrated Flow

The next major decision is determining whether runoff is sheet flow or concentrated flow.

Sheet flow occurs when runoff moves broadly across the ground surface as a shallow, relatively uniform layer. Many perimeter controls are designed for this condition. Silt fence, filter sock, sediment tubes, wattles, and similar BMPs can perform well when water is shallow, slow, and distributed.

Concentrated flow is different. Once runoff collects into a swale, ditch, channel, low point, or defined drainage path, velocity and energy increase. Products designed for sheet flow may quickly become overwhelmed when placed in concentrated flow conditions.

In concentrated flow areas, the solution may involve ditch checks, Erosion Eels, rock check dams, diversion systems, reinforced channels, slope drains, inlet protection, or other specialized BMPs.

Many perimeter control failures occur because this distinction is ignored. A BMP can be installed correctly and still fail if it is placed in the wrong flow condition.

12.3 Fence vs Tube Decision Framework

Fence systems and tube systems each have a place in erosion control.

Fence systems are typically appropriate when a defined perimeter barrier is required, vertical sediment storage is useful, or the project specification requires a fence system. Commercial silt fence, TDOT silt fence, wire-backed fence, SmartFence, and Silt Saver systems all fit within this general category.

Tube systems are often appropriate when installation speed, ground conformity, reduced trenching, flexibility, or end-of-project handling are important. Filter sock, Siltworm, sediment tubes, wattles, Erosion Eels, coir logs, and similar products can provide advantages where the site needs a more flexible or surface-applied BMP.

Neither category is universally superior. Fence systems may provide better vertical storage and a clearly defined barrier. Tube systems may install faster, conform better to uneven ground, and reduce removal labor or mixed construction waste.

The site determines the solution.

12.4 Anchored vs Weighted Systems

Another important decision is whether the BMP depends primarily on anchoring or weight.

Anchored systems rely on stakes, posts, pins, staples, trenching, or other fastening methods to remain in place. Silt fence, straw wattles, coir logs, excelsior logs, and some sediment tubes often depend heavily on proper anchoring. Their performance can be excellent, but only if the installation holds during runoff events.
Weighted systems rely more heavily on the mass of the product or fill material. Filter sock, Siltworm, Erosion Eels, mulch tubes, and other weighted sediment barriers may require less trenching and can often be installed more quickly. In some cases, they also conform better to uneven ground and are easier to relocate or remove.

The decision depends on slope, soil conditions, runoff volume, labor availability, installation access, maintenance expectations, and project duration. Anchored systems may provide strong defined placement. Weighted systems may provide faster installation and better field flexibility.

The best choice is the one that stays in place, stays in contact with the ground, and performs under the conditions expected.

12.5 Slope Interruption Decision Framework

Long slopes create erosion problems because runoff gains energy as it travels downslope.

When evaluating a disturbed slope, ask three questions:

How long is the slope?

How steep is the slope?

How much runoff is expected?

As slope length and steepness increase, slope interruption becomes increasingly important. Waiting until runoff reaches the bottom of the slope often places too much demand on the perimeter control. By that point, the water may already have enough energy to carry sediment, cut rills, or overload the BMP at the base.

Products commonly used for slope interruption include straw wattles, filter sock, Siltworm, Erosion Eels, coir logs, and other sediment tube systems. The objective is to slow water early, reduce the effective slope length, encourage sediment deposition, and prevent small erosion problems from becoming larger failures downstream.

Slope interruption is one of the most effective erosion control strategies because it manages runoff before it gains momentum.

12.6 Construction Entrance Decision Framework

Construction entrances should be evaluated as part of the overall erosion control system, not as isolated stone pads.

When reviewing a construction entrance, ask how many vehicles will use it, how muddy the site conditions are, how long the entrance will remain active, whether the subgrade is stable, whether geotextile is required, and whether additional perimeter controls are needed around the access point.

A stabilized aggregate entrance can reduce tracking, but it may not control runoff approaching from the sides or sediment bypassing around the entrance. Companion BMPs such as filter sock, Erosion Eels, DuraWattle, sediment tubes, silt fence, or diversion berms may be needed to protect the edges and direct traffic through the stabilized access point.

The best construction entrances combine access control, aggregate, geotextile, runoff management, companion perimeter controls, and maintenance. Their purpose is not simply to satisfy a plan requirement. Their purpose is to keep sediment from being tracked into the public right-of-way.

12.7 TDOT vs Commercial Applications

Project type influences BMP selection.

Commercial projects often prioritize cost, installation speed, flexibility, and availability. A standard commercial silt fence, filter sock, straw wattle, or sediment tube may be appropriate when site conditions are manageable and specifications allow it.

Transportation projects often prioritize durability, structural performance, specification compliance, visibility, inspection consistency, and long-term exposure. TDOT silt fence, wire-backed systems, advanced sediment barriers, Silt Saver products, SmartFence, Erosion Eels, and other higher-performance BMPs may be more appropriate where project demands are greater.

The important point is that the same product is not always appropriate across all project types. A BMP that works well on a small private development may not meet the expectations of a roadway project, municipal infrastructure site, or TDOT-controlled application.

Understanding the project requirements helps narrow the appropriate product selection before price is ever discussed.

12.8 The Terrain Civil BMP Selection Matrix

When evaluating perimeter controls, ask a consistent set of questions.

What type of flow exists?

What is the drainage area?

What is the slope length?

How much sediment loading is expected?

What specifications apply?

What maintenance resources are available?

What labor resources are available?

What happens to the product at project closeout?

These questions create a practical decision framework for contractors, inspectors, estimators, engineers, distributors, and project owners. They shift the conversation away from product preference and toward site conditions.

The answers often determine the most appropriate BMP. If the flow is shallow and distributed, a standard perimeter control may work. If runoff is concentrated, a stronger or more specialized system may be needed. If labor is limited, an easier-to-install product may provide better total value. If the project is long-term or environmentally sensitive, durability, biodegradability, reusability, or end-of-project disposal may become more important.

The product is the final decision. The questions come first.

Chapter Summary

One of the goals of TerrainIQ is helping people think differently about erosion control.

Most people learn products first. Experienced professionals learn water first. When you understand runoff, sediment movement, drainage areas, slope conditions, construction phasing, maintenance realities, and site constraints, the products begin to make sense.

Throughout this module, we have repeatedly returned to the same idea: the product is simply the tool. Understanding the problem is the real skill.

The TerrainIQ decision process begins by identifying the water, identifying the sediment source, evaluating flow conditions, reviewing site constraints, determining performance requirements, and then selecting the BMP. The sequence matters. Products come last.

Successful BMP selection begins with understanding site conditions. Water movement drives erosion control decisions. Flow conditions influence product selection. Installation and maintenance are as important as material selection. End-of-project handling, waste reduction, regulatory acceptance, and lifecycle cost also influence the best solution.

The most effective erosion control professionals do not ask, "What product do I like best?"
They ask, "What is this site asking the BMP to do?"

When that question is answered clearly, the appropriate solution usually becomes much easier to identify.

Conclusion

Perimeter control is one of the most visible parts of erosion and sediment control, but it is also one of the most misunderstood.

Throughout this module, we examined silt fence, advanced sediment barriers, sediment tubes, straw wattles, filter sock, Siltworm, Erosion Eels, coir logs, compost berms, mulch berms, DuraWattle, construction entrances, and specialty BMPs. Each product has value when it is used in the right application. Each product also has limits when it is asked to perform outside its intended purpose.
The most important lesson from this module is that successful erosion control does not begin with products. It begins with water.

Before selecting any BMP, an experienced professional first asks where runoff is coming from, where it is going, how much drainage area is contributing, whether the flow is sheet flow or concentrated flow, how much sediment is expected, and how the site will change as construction progresses. Once those questions are answered, product selection becomes much more logical.

We also learned that perimeter controls do more than trap sediment. They intercept runoff, reduce velocity, encourage deposition, interrupt slope length, support tracking control, and help manage stormwater before it ever reaches the drainage system. In many ways, perimeter controls are the first opportunity to influence runoff on an active construction site.

Installation and maintenance remain just as important as material selection. A properly maintained BMP made from average materials will often outperform a premium product that is poorly installed or neglected. Ground contact, trenching, staking, anchoring, terminations, inspections, sediment removal, repairs, and replacement decisions all influence long-term performance.

This module also introduced a broader way of thinking about total value. The best BMP is not always the cheapest product on the front end or the most advanced product in the catalog. The best BMP is the one that matches the site conditions, satisfies the specification, can be installed and maintained properly, reduces risk, and performs over the life of the project. In some cases, that may be commercial silt fence.

In others, it may be Silt Saver, SmartFence, Siltworm, Erosion Eels, DuraWattle, coir logs, or a combination of multiple BMPs working together.

Perimeter control is not simply a regulatory requirement. It is a practical field discipline that protects infrastructure, reduces downstream impacts, supports compliance, and helps keep sediment where it belongs. When contractors, inspectors, engineers, estimators, distributors, and owners understand the reasoning behind BMP selection, the entire project benefits.

The principles are simple, but they require discipline.
Understand the site.
Understand the water.
Understand the sediment.
Select the BMP that matches the problem.

That is the foundation of effective perimeter control, and it is the TerrainIQ approach to erosion and sediment management.

Internal Use Only

Appendix M - Marketing & SEO Implementation Guide

Module 5 - Perimeter Control Systems and Sediment Containment
Managing Runoff, Sediment Movement, and Construction Site BMP Selection Before Stormwater Enters the Drainage System

Module Category:	Erosion Control / Sediment Control / Construction Stormwater Management
Primary Keyword:	Perimeter Controls
Secondary Keywords:	Erosion Control BMPs Sediment Control BMPs Silt Fence TDOT Silt Fence Commercial Silt Fence Wire-Back Silt Fence SmartFence Silt Saver Siltworm Filter Sock Straw Wattles Erosion Eels Coir Logs Construction Entrances Slope Interruption Sediment Tubes Construction Site Runoff Stormwater BMPs Tracking Control Erosion and Sediment Control Middle Tennessee Erosion Control Nashville Stormwater BMPs
Long-Tail Search Phrases:	What are perimeter control BMPs? What is erosion control on a construction site? What is sediment control on a construction site? How does silt fence work? What is the difference between commercial silt fence and TDOT silt fence? What is wire-backed silt fence? What is SmartFence?

What is Silt Saver?
What is a silt fence outlet?
What is filter sock used for?
What is Siltworm filter sock?
What are straw wattles used for?
What is slope interruption in erosion control?
What are Erosion Eels used for?
What are coir logs used for?
What is DuraWattle?
How do construction entrances reduce sediment tracking?
What is the difference between sheet flow and concentrated flow?
Why do erosion control BMPs fail?
How do you choose the right perimeter control BMP?

Suggested URL Slug: /terrain-civil-university/perimeter-control-systems-sediment-containment

Page Title (SEO Title): Perimeter Control BMPs - Silt Fence, Filter Sock, Wattles & Sediment Control

Meta Description: Learn how perimeter control BMPs such as silt fence, filter sock, Siltworm, straw wattles, Erosion Eels, Silt Saver, SmartFence, coir logs, DuraWattle, and construction entrances help manage runoff, reduce sediment movement, and protect downstream infrastructure.

Website Summary: Before stormwater reaches a catch basin, storm sewer, detention system, or water quality treatment device, it first moves across the construction site. During that movement, runoff can detach soil, transport sediment, damage slopes, clog drainage systems, and create regulatory concerns.

This module explores the perimeter control systems used to manage runoff and sediment before they leave the project site. Topics include commercial silt fence, TDOT silt fence, wire-backed systems, SmartFence, Silt Saver, silt fence outlets, sediment tubes, straw wattles, filter sock, Siltworm, Erosion Eels, coir logs, compost berms, mulch berms, DuraWattle, construction entrances, and specialty BMPs.

Using practical field-based examples, readers will learn the difference between sheet flow and concentrated flow, why drainage area and slope length matter, how slope interruption works, why installation and maintenance are critical, and how to select perimeter controls based on site conditions rather than product familiarity.
Whether you're an engineer, contractor, superintendent, inspector,

estimator, developer, municipal official, or student, this module provides a practical understanding of erosion control and sediment control, and BMP selection on active construction sites.

Call-To-Action Button: Start Module 5 →

Suggested Internal Links:

Module 1 - Stormwater Management Fundamentals
Module 2 - Stormwater Treatment Technologies
Module 3 - Green Stormwater Infrastructure
Module 4 - Stormwater Fundamentals & Basic Hydrologic Calculations
Module 6 - Geotextiles & Geosynthetics
Erosion Control Products
Commercial Silt Fence
TDOT Silt Fence
Wire-Back Silt Fence
SmartFence
Silt Saver
Siltworm
Filter Sock
Straw Wattles
Erosion Eels
Coir Logs
DuraWattle
Construction Entrances
Geotextiles
Erosion Control Blankets
Stormwater BMPs
TerrainIQ

Suggested External Authority References:

EPA Construction Stormwater Program
TDEC Construction Stormwater Program
TDOT Erosion Prevention and Sediment Control Standards
Metro Nashville Stormwater Management
Silt Saver
Siltworm
SmartFence
DuraWattle
Filtrexx
Western Green / MKB
American Excelsior
IECA

Image Alt Text:

Figure 5.1: Commercial silt fence installed along the downslope perimeter of a disturbed construction site.

Figure 5.2: TDOT silt fence showing heavier fabric, larger posts, and closer post spacing.

Figure 5.3: Proper silt fence J-hook termination used to prevent runoff from bypassing the end of the fence.

Figure 5.4: Silt fence roll-to-roll connection showing overlapping posts wrapped together for a stronger transition.

Figure 5.5: Silt Saver sediment barrier system used as an advanced alternative to traditional wire-backed silt fence.

Figure 5.6: SmartFence reinforced sediment barrier installed along a construction site perimeter.

Figure 5.7: Straw wattles installed across a disturbed slope for slope interruption and runoff velocity reduction.

Figure 5.8: Filter sock installed along contour to intercept sheet flow and reduce sediment movement.

Figure 5.9: Siltworm filter sock used as a rolled filtration system for perimeter control and sediment capture.

Figure 5.10: Erosion Eel used as a durable sediment control BMP in a temporary drainage swale.

Figure 5.11: Coir log installed along a waterway for long-term stabilization and vegetation establishment.

Figure 5.12: DuraWattle used at a curb line or paved egress point for reusable sediment control.

Figure 5.13: Construction entrance with aggregate and geotextile used to reduce sediment tracking onto public roads.

Figure 5.14: Comparison of proper and improper perimeter control installation showing ground contact, staking, and bypass conditions.

Social Media Teaser:

Before stormwater enters the drainage system, it first moves across the construction site. Module 5 of Terrain Civil University explores how perimeter control BMPs such as silt fence, filter sock, Siltworm, straw wattles, Erosion Eels, Silt Saver, SmartFence, coir logs, DuraWattle, and construction entrances help manage runoff, control sediment, and protect downstream infrastructure.

Learn why successful erosion control begins with understanding water, slope, drainage area, sediment loading, and site conditions before selecting the BMP.

Future Content Opportunities:

What Are Perimeter Control BMPs?
Commercial Silt Fence vs TDOT Silt Fence
How Does Silt Fence Work?
Why Silt Fence Fails
Wire-Back Silt Fence Explained
SmartFence vs Wire-Back Silt Fence
Silt Saver Systems Explained
What Is a Silt Fence Outlet?
Filter Sock vs Silt Fence
Siltworm Filter Sock Explained
Straw Wattles and Slope Interruption
Erosion Eels Explained
Coir Logs for Streambank Stabilization
DuraWattle for Hard Surface Sediment Control
Construction Entrance Best Practices
Sheet Flow vs Concentrated Flow
How to Choose the Right Sediment Control BMP
Erosion Control Installation Mistakes
BMP Inspection and Maintenance Checklist
TerrainIQ Perimeter Control Selection Guide

Strategic Purpose:

This module positions Terrain Civil as a trusted educational resource in erosion control, sediment control, construction stormwater management, and perimeter control BMP selection. It expands Terrain Civil University's topical authority beyond stormwater fundamentals and water quality treatment by addressing the field-level practices used to manage runoff and sediment before stormwater enters the drainage system.
Module 5 strengthens Terrain Civil's visibility among contractors, inspectors, civil engineers, municipalities, developers, utility contractors, highway contractors, estimators, and project owners by demonstrating practical knowledge of product selection, installation, maintenance, regulatory expectations, and site evaluation.
The module also creates strong internal linking opportunities to current and future product categories including silt fence, filter sock, Siltworm, Silt Saver, SmartFence, Erosion Eels,

DuraWattle, coir logs, construction entrances, geotextiles, erosion control blankets, drainage systems, and TerrainIQ. Most importantly, this module reinforces the TerrainIQ philosophy that successful BMP selection begins with understanding the site, the water, the sediment, and the problem before selecting the product.

Frequently Asked Questions

What are perimeter control BMPs?

Perimeter control BMPs are erosion and sediment control practices used to intercept runoff, reduce flow velocity, encourage sediment deposition, and help prevent soil from leaving a construction site. Common examples include silt fence, filter sock, straw wattles, sediment tubes, Erosion Eels, coir logs, compost berms, mulch berms, and construction entrance controls.

Their purpose is not to stop water completely. Their purpose is to manage how water moves across disturbed ground before it reaches adjacent properties, roadways, drainage systems, streams, or other sensitive areas.

Why are perimeter controls important on construction sites?

Construction activities expose soil to rainfall and runoff. Once soil is disturbed, stormwater can detach particles, transport sediment, clog drainage systems, reduce detention pond capacity, damage downstream infrastructure, and impair nearby streams or wetlands.

Perimeter controls help reduce these impacts by managing runoff before sediment leaves the project site. They are often one of the first lines of defense in an erosion and sediment control plan.

What is the difference between sheet flow and concentrated flow?

Sheet flow occurs when runoff moves broadly across the ground surface as a shallow, relatively even layer. Many perimeter controls, including silt fence, filter sock, straw wattles, and sediment tubes, are designed to manage sheet flow conditions.

Concentrated flow occurs when runoff collects into a defined path such as a swale, ditch, channel, low point, or temporary drainage route. Concentrated flow has more depth, velocity, and erosive energy. Many BMP failures occur when products designed for sheet flow are installed in concentrated flow areas.

How does silt fence work?

Silt fence is a temporary sediment barrier made from geotextile fabric supported by posts. It is designed to intercept shallow sheet flow, slow runoff, create temporary ponding, and allow sediment to settle before water leaves the disturbed area.

Silt fence is not intended to function as a dam or manage heavy concentrated flow. It performs best when drainage area is limited, runoff remains shallow, and the fence is properly trenched, terminated, maintained, and installed along the contour of the land.

What is the difference between commercial silt fence and TDOT silt fence?

Commercial silt fence is commonly used on private development projects and typically consists of lighter fabric and smaller posts. Terrain Civil's standard commercial silt fence uses 70 gram geotextile fabric, 1.25-inch hardwood posts, and is supplied in 100-foot rolls with 6-foot or 10-foot post spacing.

TDOT silt fence is a heavier-duty system used for transportation and infrastructure projects. It typically uses 100 gram fabric, 1.75-inch hardwood posts, and 6-foot post spacing. The heavier material reflects the increased durability and performance expectations often associated with roadway and public infrastructure work.

When should filter sock be used instead of silt fence?

Filter sock may be a strong option when installation speed, flexibility, ground contact, reduced trenching, and end-of-project handling are important. It can be used for perimeter control, slope interruption, inlet protection, construction entrance support, and temporary runoff management.

Unlike silt fence, filter sock is typically placed directly on the ground surface and allows water to pass through the media at a reduced velocity. It can perform well when properly sized, placed, staked where needed, and maintained. The fill material is especially important because compost, wood fiber, inert media, and engineered blends can perform differently in the field.

What are straw wattles used for?

Straw wattles are commonly used for slope interruption, temporary erosion control, and runoff velocity reduction. Their greatest value often comes from being installed across slopes at intervals to slow water before it gains too much energy.

Rather than waiting for all runoff and sediment to reach the bottom of a slope, wattles help break the slope into smaller segments. This reduces velocity, encourages sediment deposition, and lowers the burden on perimeter controls installed downslope.

What are Erosion Eels used for?

Erosion Eels are high-performance, weighted sediment control BMPs used where durability, hydraulic stability, and reduced maintenance are important. They can function as perimeter controls, slope interruption devices, ditch checks, construction entrance support, and sediment barriers in more demanding field conditions.

Compared to many lighter wattles, filter socks, or sediment tubes, Erosion Eels are designed to better resist movement, maintain shape, and perform through repeated runoff exposure.

Why do erosion control BMPs fail?

Most BMP failures are not product failures. They are application, installation, or maintenance failures.

Common causes include selecting the wrong product for the site conditions, placing a sheet flow BMP in concentrated flow, failing to trench or anchor properly, poor ground contact, improper terminations, excessive drainage area, sediment buildup, damage from equipment, and lack of maintenance after storm events.

The best erosion control professionals evaluate the water, sediment, slope, drainage area, and site conditions before selecting the BMP.

How do I choose the right perimeter control BMP?

The best BMP is selected by understanding the site before choosing the product. Start by asking where the runoff is coming from, where it is going, whether the flow is sheet flow or concentrated flow, how much drainage area contributes to the BMP, how long and steep the slope is, how much sediment is expected, and what specifications apply.

The TerrainIQ approach is simple: understand the site, understand the water, understand the sediment, and then select the BMP that best matches the problem. Products come last because site conditions determine the solution.