# Appendix I – Post-Construction Operation and Maintenance (O&M) Manual

# Post-Construction Operation and Maintenance (O&M) Manual for Stormwater Management Facilities

## for

## FLAT CREEK SOLAR PROJECT

**TOWN OF CANAJOHARIE AND ROOT**
**MONTGOMERY COUNTY, NEW YORK**

**SPDES Permit #: ____________**

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## 1.0 Introduction

The stormwater management system for the Flat Creek Solar Project (Facility) consists of infiltration trenches, vegetated filter strips, and two detention basins with associated outlet control structures and overflow weirs. The following O&M Manual outlines the minimum requirements for maintaining the stormwater management facilities, as required in Section 3.5 of the New York State Stormwater Management Design Manual (SMDM).

### 1.1 Purpose of the Manual

This manual is intended to outline the requirements for proper maintenance and operation of the stormwater management facilities associated with Facility. Proper maintenance ensures the following:

- Stormwater facilities operate as they were designed;
- Stormwater facilities remain free of sediment, debris, and potential pollutants; and
- Stormwater facilities do not result in adverse downstream impacts to environmentally sensitive areas.

The Facility will be solely-owned, operated, and maintained by Flat Creek Solar LLC (the Owner). The Owner is responsible for ensuring that the stormwater management facilities installed on the Project Site are properly maintained and that they function as designed. In some cases, the maintenance responsibility may be assigned to others through special maintenance agreements. NYSDEC maintenance guidance and stormwater practice inspection checklists with stormwater management practice schematics for the Project Site are provided in Appendix A and B. Maintenance agreements associated with this Project shall be included in Appendix C of this Manual.

This Manual details the various stormwater facility components and the general operation and maintenance activities required for each component. Additional operation and maintenance information may be found in the SMDM) and the New York State Standards and Specifications for Erosion and Sediment Control.

## 2.0 Inspection and Maintenance Schedule

The stormwater management systems shall be inspected and maintained regularly to ensure proper site function. Inspection frequency may depend on the stormwater management systems and facilities present at the Project Site.

A Maintenance Inspection Form shall be completed during each inspection to document the Site conditions and required maintenance activities. Maintenance activities may include, but are not limited to, removal of sediment, trash, or debris; vegetation management; erosion repair; and revegetation of exposed soils. A blank sample Maintenance Inspection Form has been included in Appendix D. Completed Maintenance Inspection Forms shall be incorporated into Appendix E.

## 3.0 First Year Maintenance

The following maintenance activities are required during the first year following Project completion:

- Water vegetation once every three days for the first month, then provide a half inch of water per week during the first year.
- Fertilization may be needed in the fall after the first growing season to increase plant vigor. Fertilizer application and use should be in accordance with local, state, and federal laws and regulations.
- Keep the site free of vehicular and foot traffic and other weight loads.

## 4.0 General Site Maintenance

Site cover and associated structures should be inspected periodically for the first few months following construction and then on a bi-annual basis. Site inspections should also be performed following major weather events such as, but not limited to, major storm events, thunderstorms, and significant snow melt.

Items to inspect for include, but are not limited to:

- Differential settlement of embankments, cracking, or erosion.
- Lack of vegetative cover density.
- Sediment accumulation on the ground surface or within stormwater management practices or conveyance systems.
- Accumulation of debris, litter, or pollutants such as oil or grease on the ground surface or within stormwater management practices or conveyance systems.
- Damage to or weakness of stormwater management practices or conveyance systems.

### 4.1 Site Restoration

Areas within a Project Site that have undergone site restoration should be inspected periodically for the first six months and once after each storm event greater than a half-inch.

Items to inspect for include, but are not limited to:

- Checking embankments for subsidence, erosion, cracking, undesirable tree and shrub growth, and the presence of burrowing animals.
- Health and vigor of vegetation such as trees, shrubs, grass, and flowers.
- Accumulation of sediment or vegetative debris such as leaves and branches.

### 4.2 Tree Planting/Preservation

During the first three years, mulching, watering and protection of young trees is necessary. Inspection of trees should be performed every three months and within the one week of ice storms and high wind events, reaching speeds of 20 mph, until trees have reached maturity. As a minimum, inspection should include assessment of tree health, inspection for evidence of damage or disease, and determining the survival rate of damage and diseased trees. Trees shall be pruned and treated as necessary, and dead trees shall be replaced.

## 5.0 Winter Maintenance

Plowing and shoveling will be the primary method of snow removal for winter maintenance access across the Facility Site. Winter maintenances access within the array areas will be infrequent. Should de-icing materials be required for access during winter months, the Owner/Operator will work with State agencies to determine which de-icing material may be used, specifically on pervious access roads and within agricultural lands.

To prevent impacts to stormwater management facilities, the following winter maintenance limitations, restrictions, and/or requirements are recommended:

- Remove snow and ice from catch basins, inlet and outlet structures, and away from culvert end sections.
- Snow plowed or removed should not be piled at inlets/outlets of stormwater management practices or structures.

## 6.0 Operation and Maintenance Procedures: Stormwater Management Facilities

### 6.1 Riparian Buffers and Filter Strips

Vegetated filter strips or undisturbed natural areas such as riparian buffers are utilized to treat and control stormwater runoff from areas of development. Vegetated filter strips are vegetated surfaces designed to treat sheet flow from adjacent areas and removed pollutants through filtration and infiltration.

*General Inspection Requirements*

The riparian buffers and/or filter strips shall be inspected annually for damage and debris. Damage may include, but is not limited to, exposed soils, erosion or channelization, and reduction in the buffer length. The buffer length shall be maintained at the design length to ensure effectiveness of the practice.

*Erosion and Sedimentation*

If sedimentation occurs, the sediment shall be removed with a hand shovel when greater than two inches of sediment is present. If erosion or channelization is experienced, upstream maintenance may be required to repair an underlying problem contributing to the damages.

*Vegetation Management*

Vegetation within filter strips shall be mowed to a minimum height of four inches with a minimum of four cuttings per year. Exposed soils within filter strips shall be reseeded and mulch, as needed.

Riparian buffers shall remain as undisturbed natural areas to ensure effectiveness of the practice.

*Flow Spreaders and Level Spreaders*

Flow spreaders or level spreaders installed in association with the riparian buffer or filter strip shall be maintained in accordance with Section 6.3 of this Manual.

### 6.2 Flow Spreaders/Level Spreader

A flow spreader/level spreader is a device used to distribute stormwater uniformly over the ground surface as sheet flow to prevent concentrated, erosive flows and promote infiltration.

*General Inspection Requirements*

Flow spreaders/level spreaders shall be inspected semi-annually and following major storm events for the first year. After the first year, the spreaders shall be inspected annually and after major storm events. The spreader shall be inspected for channelization, erosion, trash/debris, and sedimentation.

*Erosion and Channelization*

Channelization and erosion with the spreaders shall be repaired immediately. Channelization and erosion may occur within the upslope areas, around the weir, or in the stabilized outlet.

*Sedimentation*

Sediment shall be removed when it has accumulated to 10 to 20 percent of the design volume or channel capacity.

*Trash and Debris*

Trash and debris shall be removed as necessary and disposed of at an approved solid waste disposal facility.

Vegetated spreaders shall be mowed as necessary. Seed and mulch the disturbed areas as needed to maintain a vegetative cover.

### 6.3 Detention Ponds

Detention pond are designed to hold and slowly release stormwater through infiltration and/or a specially designed stormwater control structure.

*General Inspection Requirements*

The detention ponds shall be inspected at least once per year and after major storm events. The ponds shall be inspected for erosion, sedimentation, debris/trash, and vegetative debris. The stormwater control structure shall be inspected for sediment, debris/trash, and damage or deterioration.

*Access and Vegetation Management*

Access to the pond shall be inspected and maintained. Access should extend to the forebay, safety bench, riser, and outlet area.

Vegetation shall be managed around the pond and vegetative debris shall be removed as necessary to prevent accumulation in the pond.

*Safety and Security Features*

Safety and security features shall be inspected to ensure the features are functioning as designed. A warning sign shall be posted prohibiting swimming, wading, and skating, warning of possible contamination or pollution of the pond water and indicating the maximum pond depth.

Perimeter fencing shall be inspected for damage.

*Trash and Debris*

Trash and debris shall be removed from the pond and on trash racks immediately. The low flow orifice shall be inspection for clogging. Maintenance to the low flow orifice shall be completed as necessary.

Trash and debris shall be disposed of at an approved solid waste disposal facility.

*Erosion and Sedimentation*

Erosion may occur within the pond, forebay or the outlet area. Erosion shall be repaired immediately to prevent further damage to the pond.

Sediment shall be removed from the pond forebay every five to six years or when sediment has reach 50% of the forebay capacity. Sediment shall be disposed of at an approved solid waste disposal facility.

The pond dimensions and location shall not be altered in any way. Proper notification is required if the pond must be drained for maintenance purposes. Consultation with a licensed engineer may be necessary if erosion issues persist.

*Pond Drain*

The drain pipe shall be inspected to ensure it is functioning properly. Inspect the pipe for clogging and sediment deposition. The drain pipe should drain the pond to the design level within 24 hours.

### 6.4 Infiltration Facilities

Infiltration facilities dispose of stormwater by detaining the water and allowing it to infiltrate into the ground. Infiltration facilities may be designed to handle all or a portion of the runoff from a Project Site, or they may overflow and bypass larger storms to alternate systems.

*General Inspection Requirements*

Stormwater infiltration systems shall be inspected annually and after major storm events. The facility should be inspected following a storm event to ensure the system is functioning properly and maintaining the capacity to infiltrate the stormwater. A monitoring well may be utilized to inspect the functionality of the system. The system shall be inspected for sedimentation, debris/trash, and damage.

*Access and Vegetation Management*

Direct access to the infiltration facility shall be available at all times. Vegetation shall be managed to sustain the facility and allow for access. Seed and mulch bare soils are needed to maintain adequate soil cover.

*Trash and Debris*

Trash and debris shall be removed as needed.

*Erosion and Sedimentation*

Sediment shall be removed from the system when it accumulates to two inches, or when the system is not draining properly. The sediment shall be removed with a hand shovel and disposed of at an approved solid waste disposal facility. The infiltration facility shall be inspected annually for sediment deposition.

Inspect the system for displacement of aggregate material. Remove the displaced aggregate and repair the infiltration facility as needed to meet the design specifications.

*System Functionality and Dewatering*

The infiltration system shall fully dewater within 48 hours of a storm event. Damage to the infiltration system shall be repaired immediately following identification. The overflow from the infiltration system shall be inspected for damage and to ensure the system is operating correctly.

## 7.0 Operation and Maintenance Procedures: Stormwater Structures and Features

### 7.1 Storm Culverts and Drainage Pipes

Storm culverts and drainage pipes convey stormwater throughout the Project Site. The storm culverts and drainage pipes shall be inspected annually and after major storm events to assess for damage and obstructions. Storm culverts and drainage pipes may experience damage such as cracking, warping due to compaction, or corrosion. The culverts and piping shall be repaired or replaced when 25% or more of the structure has been compromised.

Sediment build-up and debris/trash shall be removed and disposed of at an approved soil waste disposal facility. Improper removal of sediment and debris/trash may result in flooding and adverse impacts to upstream areas. Use of a hand shovel is recommended for sediment removal.

Riprap outlet protection and stone aprons at the outlets of storm culverts and drainage pipes shall be inspected as detailed in Section 8.1 of this Manual. The inlets and outlets shall be assessed for erosive conditions. Repair to erosion shall be completed as needed.

Vegetation shall be maintained to prevent excess vegetative growth at the inlets and outlets of the culverts and piping.

## 8.0 Operation and Maintenance Procedures: Miscellaneous Items

### 8.1 End Sections

End sections are found at the end of pipes and typically include rock outlet protection such as riprap stone aprons. The purpose of riprap aprons placed at the end of pipes is to reduce the velocity, depth, and energy of stormwater, such that the flow will not erode downstream areas.

The end section(s) of pipes, including stone aprons, should be visually inspected for trash and sediment at least twice per year and after major storm events. If trash is observed, it should be removed and disposed of properly. If excess sediment deposition is observed on the stone apron, measures should be taken to remove the sediment. Excessive sedimentation occurs when the stones on the bottom of the apron are no longer visible due to sediment deposition. It is recommended that accumulated sediments be removed with a hand shovel and disposed of off-site at an approved or otherwise authorized solid waste disposal facility.

### 8.2 Fences, Gates, and Signage

Fences have been installed around the perimeter of stormwater facilities in order to restrict entry to the facility, and to protecting the public and wildlife. Gates have been installed at various locations along the perimeter fencing to allow for maintenance access. Gates are to be secured shut with a lock except when maintenance operations are actively occurring.

Signage shall be installed at the appropriate stormwater management facilities, as detailed in the SMDM. The Owner/Operator shall erect or post, in the immediate vicinity of stormwater management practices, a conspicuous and legible sign of not less than 18 inches by 24 inches (or 10 inches by 12 inches for footprints smaller than 400 square feet) bearing the following information:

> **Stormwater Management Practice –** *(name of the practice)*
> Project Identification – (SPDES Permit number or similar)
> Must Be Maintained in Accordance With the O&M Plan
> **DO NOT REMOVE OR ALTER**

Inspect the fences, gates, and signage annually for areas needing repair or replacement. Repair or replace damaged or compromised components of the fences, gates, or signage as needed. Maintain the ground underneath the fences and gates as needed to allow safe entry and exit to the stormwater management facility and prevent further erosion impacts. Replace the signage if any information is missing or has been sun-bleached.

### 8.3 Access Roads, Gravel Parking Areas and Substation Yards

<u>Access Roads</u>

Access roads shall be maintained to allow for safe access to and from the Project Site. The access roads shall be inspected annually and after major storm events to assess for trash/debris, erosion, rilling, sedimentation, or gravel migration. Trash/debris shall be removed as needed and disposed of at an approved solid waste facility. Erosion, sedimentation, rilling, or gravel migration shall be repaired. Vegetation along the access roads shall be maintained as needed to allow for safe access to the Project Site.

<u>Pervious Access Roads</u>

Pervious access roads are to be installed after construction has finalized to prevent sediment tracking into the porous stone material or compaction of the road area. The pervious access road will require little on-going maintenance. The road areas shall be inspected annually and after major storm events to access for trash/debris, erosion, rilling, sedimentation, or gravel migration. Trash/debris shall be removed as needed and disposed of at an approved solid waste facility. Erosion, sedimentation, rilling, or gravel migration shall be repaired. Vegetation along the road areas shall be maintained as needed to allow for safe access to the Project Site.

Gravel Parking Areas

Gravel parking areas typically require little on-going maintenance, due to the limited use of heavy vehicles. The gravel parking areas shall be inspected annually and after major storm events to assess for trash/debris, erosion, rilling, sedimentation, or gravel migration. Trash/debris shall be removed as needed and disposed of at an approved solid waste facility. Erosion, sedimentation, rilling, or gravel migration shall be repaired. Vegetation along the parking areas shall be maintained as needed to allow for safe access to the Project Site.

Substation Yards

Substation yards shall be maintained to allow for safe operation at the Project Site. The substation yards shall be inspected annually and after major storm events to assess for trash/debris, erosion, rilling, sedimentation, or gravel migration. Trash/debris shall be removed as needed and disposed of at an approved solid waste facility. Erosion, sedimentation, rilling, or gravel migration shall be repaired. Vegetation around the substation yards shall be maintained as needed to allow for safe access to the Project Site.

## 9.0 Operation and Maintenance Procedures: Repair/Replacement Activities

Damage to on-site stormwater facilities and infrastructure may occur and repair or replacement may be necessary to ensure proper function. Components of the stormwater management practices, conveyance systems, or on-site structures which require repair or replacement should be addressed immediately following identification of deficiencies.

Repair of stormwater management facilities shall be completed as outlined in this Manual. Replacement of stormwater facilities or components of a facility may require assessment and design by a licensed engineer. The Owner/Operator shall read local, state, and federal regulations prior to replacement activities to ensure compliance.

## 10.0 Contact Information

Questions about the stormwater management systems and operation and maintenance procedures should be directed to the Owner/Operator.

# Appendix A – NYSDEC Maintenance Guidance

NEW YORK STATE OF OPPORTUNITY. | Department of Environmental Conservation

# MAINTENANCE GUIDANCE

## Stormwater Management Practices

March 31, 2017

**FINAL**

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# Section 1. Introduction

## 1.1. Stormwater Management Practice (SMP) Groups

Stormwater management has become an important function for municipalities to address the quality of local water resources and to adhere to state standards. Increasingly, stormwater management practices (SMPs) are constructed as part of new development or redevelopment projects as retrofits to existing infrastructure and/or as part of local watershed restoration plan efforts.

While SMPs are proliferating, municipalities are charged with a certain level of implementation and oversight. Whether this is a new function for a municipality or an expansion of existing programs, it is important for these local programs to have some degree of guidance to successfully meet the challenge. One important area where guidance has been lacking is how to properly operate and maintain the wide range of SMPs that are constructed. This chapter was developed to address this need. It is widely understood that SMPs will not function properly to protect water resources without attention to operation and maintenance (O&M), and that O&M tasks and responsibilities must be identified and assumed by various stakeholders.

The chapter is structured around a hierarchy concept where O&M responsibilities are addressed by SMP owners/property managers, municipal staff, landscape contractors and professionals with knowledge in stormwater management (Qualified Professional). The hierarchy approach, explained in more detail below in Section 1.2, strives for a cost-efficient way to ensure long-term performance of SMPs.

The maintenance procedures described in this chapter are applied to ten separate SMP groups (**Table 1.1**). These same ten groups are used to separate maintenance inspection guidance, costs, and other guidance in the chapter.

**Table 1.1 Practices Discussed in this Chapter, by Group**

| SMP Group | Practices Included |
|---|---|
| Rainwater Harvesting | • Rain Barrel<br>• Cistern |
| Disconnection and Sheetflow | • Rooftop Disconnection<br>• Sheetflow to Filter Strip<br>• Sheetflow to Riparian Buffers |
| Swales | • Vegetated Swale<br>• Wet Swale |
| Tree Planting | • Tree Planting |
| Bioretention | • Bioretention Cell<br>• Dry Swale<br>• Rain Garden<br>• Stormwater Planters<br>• Tree Pits |
| Green Roofs | • Green Roofs |
| Permeable Pavements | • Permeable Pavers<br>• Porous Asphalt/Concrete |
| Ponds and Wetlands | • Wet Pond Design Options<br>• Stormwater Wetland Design Options |
| Infiltration | • Infiltration Trench<br>• Infiltration Basin<br>• Dry Well |
| Sand and Organic Filters | • Surface Sand Filters<br>• Underground Sand Filters<br>• Underground Organic Filters |

## 1.2. Maintenance Hierarchy

SMPs require inspections and maintenance to identify small problems before they become more serious and expensive to repair. For example, removing a small amount of sediment from a filtering medium or permeable pavement surface is much less expensive than replacing a surface that has already become clogged. However, it can be cost prohibitive for most communities or SMP owners to hire highly trained staff or contractors to inspect these practices or to carry out the actual maintenance tasks. This can be especially true with the advent of "micro-scale" Green Infrastructure practices, which may be distributed across many individual public and private properties, and where the absolute number of SMPs within a municipality may exceed local government inspection and maintenance capabilities.

Many SMP maintenance problems start out as fairly small, easily rectified issues as long as they are detected early enough through an inspection. For these issues, property owners or managers can likely take care of the issue in an expedient and cost-effective manner.

However, at some point, property owners or managers will encounter an issue where diagnosing the problem and knowing the appropriate remedy will exceed their technical capabilities. At this point, an individual with training in SMP inspection, operation and maintenance, such as a municipal inspector or landscape contractor, may have to be called in for assistance.

Similarly, some problems escalate to the point where a Qualified Professional (i.e. professional engineer or landscape architect) is needed to bring the SMP back to a good functioning condition. The Qualified Professional may need to bring in other experts to assess problems with the SMP. For instance, they may call in a horticulturalist to assess problems with the planting plan.

Figure 1.1 The SMP Maintenance Hierarchy Pyramid

Acknowledging this step-wise approach to SMP inspection and maintenance, the SMP Maintenance Hierarchy concept was developed. The concept uses a combination of skill levels (**Figure 1.1**) as explained in more detail below.

### Level 1: Property Owners and Managers, Interns, etc.

This category includes property owners, property managers, or HOA representatives, for privately owned SMPs. For municipally owned SMPS, this could include municipal maintenance staff or interns, and volunteers. These individuals would typically have no or only very limited training in stormwater maintenance and inspection but can use available guidance to quickly identify and rectify common and simple issues with SMP performance. This level completes routine inspections and maintenance activities. For most SMPs, the majority of inspection and maintenance activities can be conducted at this skill level, thus Level 1 forms the base of the Maintenance Hierarchy pyramid. Many well-functioning SMPs can be adequately maintained for long periods of time using Level 1 capabilities.

Although many issues can be addressed at Level 1, these inspectors and maintainers need a relief valve when the SMP problems become harder to diagnose and/or the remedies require a higher level of resources and expertise. Such issues are referred to in this chapter as "kick-outs to Level 2." For instance, an SMP may have a minor amount of sediment that has accumulated at inlets or on the practice bottom. A Level 1 person may be able to take care of this with a flat shovel and wheel barrow. However, a Level 2 inspection would be triggered if the sediment is deep, widespread, keeps recurring, and/or requires more sophisticated equipment to remove.

### Level 2: Trained Municipal Staff

This level of inspection and maintenance is conducted primarily by municipal employees or landscape contractors who have completed training on SMP, inspection, operation and maintenance. Level 2 inspections can take place in response to two circumstances:

1. As part of an ongoing, routine municipal inspection program whereby SMPs are visited on a rotating basis at a frequency established by the local program, or

2. In response to a “kick-out” from a Level 1 inspector based on a specific problem or problems.

Circumstance #2 obviously will require coordination and communication between the Level 1 and Level 2 inspectors, with documentation and background provided by the Level 1 inspector. This is an essential part of making the hierarchy approach successful. In the example above, the Level 2 inspector can better diagnose the sources of the sediment, whether the sediment is affecting performance of the SMP, and the specific tasks needed to remove the sediment and abate the source.

As with kick-outs from Level 1 to Level 2, the same can exist from Level 2 to Level 3. It may be that the Level 2 inspector encounters a problem where a Qualified Professional is needed to re-design certain components of the SMP, and a qualified contractor is needed to undertake a more serious repair. This is when Level 3 is activated.

### Level 3: Qualified Professionals

Qualified professionals include professional engineers and landscape architects, who can revisit design issues associated with chronic or serious problems. For repair and maintenance of the SMPs at this level, individuals with specific skills and certifications, such as a certified plumber who has experience working with rainwater harvesting practices or a horticulturalist with knowledge on proper plantings may need to be called in by the Qualified Professional. Level 3 inspection or maintenance is triggered in response to specific problems identified during a Level 2 inspection.

Continuing with the example above, the Level 2 inspector identifies that the sediment is accumulating in the SMP because of the lack of pre-treatment or that the practice is not sized properly for its drainage area. The Level 2 inspector at this point should consult a Qualified Professional (Level 3) who can go back to the original or as-built plan and develop workable solutions.

**Table 1.2** further describes how maintenance and inspection activities differ among the three levels of the SMP Maintenance Hierarchy.

**Table 1.2 Maintenance/Inspection Hierarchy Levels**

| | **Level 1: Owners and Untrained Staff** | **Level 2: Trained Municipal Staff** | **Level 3: Qualified Professionals** |
|---|---|---|---|
| **Qualifications/ Training of Inspectors** | No special training, but person is provided educational materials | On-the-job training and/or short workshops Define adequate training or provide examples | Professional License such as a PE or RLA |
| **Frequency of Inspection** | At least annually | Routine as determined by the local program OR as kick-out from Level 1 inspection | Only as needed from Level 2 inspection |
| **Inspection Guidance** | Checklists are included for each practice group in **Section 2** of this chapter and in **Appendix A**. | Guidance for the inspection is included in **Section 3**, and checklists are included in **Appendix B.** | **Section 4** includes guidance for diagnosing typical problems. |
| **Typical Maintenance Activities** | Routine mowing. Trash removal. Plant care and upkeep. Mulching as needed. Removal of small amounts of sediment from pretreatment areas of the practice. | Removal of larger amounts of sediment. Structural damage repair. Minor regrading and scarification of soil surface to restore permeability. | Redesign an improperly functioning practice. Includes re-grading of the contributing drainage area, replacing soil media and plantings (new planting plan), or modifying conveyance structures. |
| **Triggers for Inspection or Maintenance by this Level** | Regular inspection (no trigger) | Level 1 Inspection Sheets (**Section 2**) describe triggers that warrant a Level 2 Inspection. | Level 2 Inspection Guidance (**Section 3**) describes triggers that warrant a Level 3 Inspection. |

## 1.3. Using the Remainder of this Chapter

This chapter provides guidance for maintaining SMPs, including inspection, maintenance activities, and maintenance planning. The chapter includes four sections as follows:

- **Section 2** outlines Level 1 inspection and maintenance procedures in the form of visual checklists. This includes guidance for inspection of each of the 10 SMP groups/categories included in this chapter, as well as specific kick-outs for Level 2.
- **Section 3** provides guidance for Level 2 inspections as to observed conditions, remedies, and triggers for Level 3.
- **Section 4** is most relevant to Level 3 and includes diagnostic measures for specific problems, as well as guidance for performing repair activities.
- **Section 5** provides an overview of planning for maintenance, including techniques for estimating maintenance costs and elements of a maintenance plan.

# Section 2. Level 1 Inspections

## 2.1. How to Use this Section

Section 2 provides guidance for Level 1 inspections of 10 groups of stormwater management practices (SMPs). See Section 1 of this chapter for an explanation of Level 1 in the Maintenance Hierarchy.

- **Section 2.2** provides general guidance for Level 1 inspections.
- **Sections 2.3 through 2.12** provide detailed Level 1 inspection guidance and inspection forms for each of the 10 practice categories:
    - 2.3 Rainwater Harvesting
    - 2.4 Disconnection and Sheetflow
    - 2.5 Swales
    - 2.6 Tree Planting
    - 2.7 Bioretention
    - 2.8 Green Roofs
    - 2.9 Permeable Pavement
    - 2.10 Ponds and Wetlands
    - 2.11 Infiltration
    - 2.12 Sand and Organic Filters

## 2.2. General Guidance for Level 1 Inspections

Regardless of which practice you are inspecting, some key procedures and equipment are necessary. Read through this guidance before going on an inspection, and use the specific guidance in **Sections 2.3 through 2.12** for the particular practice type you are inspecting. The Level 1 Inspection can be completed with minimal previous training. Typical Level 1 inspectors may include a property owner or manager (for private SMPs) or perhaps an intern or maintenance or landscape crew members in the case of a publicly owned practice. Level 1 inspections are the most frequent inspections. They are designed to identify key maintenance issues before they become more serious and to help keep up with routine maintenance tasks.

## When to Conduct a Level 1 Inspection

The Level 1 Inspection should be conducted at least annually for all practices and is often supplemented with additional visits after large storms, winter salting and sanding, or other seasonal changes. In addition, it is recommended that inspections take place more frequently during the first few years after installation of an SMP. Many issues can be identified and corrected during this early period so that they do not lead to larger problems in subsequent years. Plant establishment and health is one of these key issues. Once the SMP is stable and seems to be functioning properly, the inspections can become less frequent.

## What to Take into the Field

The Level 1 Inspection is fairly simple, and it is assumed that very little measurement will be needed. However, the inspector should take pictures to document findings and should also keep a record of the inspections. The list of needs for the Level 1 Inspection includes the following:

1. Safety vest (if SMP is located in an area near traffic)
2. Notes or records from past inspections
3. Digital camera or phone
4. Clipboard and pencils (if using paper forms), or Tablet or smartphone if using digital forms
5. Bug spray (if needed)
6. Sun block (if needed)
7. Tape measure (optional, to measure pipe sizes and SMP dimensions)
8. Letter of permission to access property if the inspector is from an outside agency (e.g., summer intern working for the municipality)
9. Site Plan showing SMPs, Planting Plan (includes planting/seed mixes) and details
10. Engineers scale
11. Flagging/stakes and waterproof marker (to mark problem areas that need to be visited again)

## Checklist and Follow-Up Actions

The Level 1 Inspection checklists included in **Sections 2.3 through 2.12** describe follow-up actions for each observed condition (See **Figure 2.2.1** for an example). A Level 1 Inspection Table is available for each component or key area of the particular SMP group. Use as follows:

- Check the box in the LEFT column if the problem is present at the site.
- Check the appropriate follow-up actions in the RIGHT column, or add your own as needed to fix the problem.
- DOCUMENT all your actions. Keep copies of the Level 1 inspection tables, plus notes, photos, or other documentation of corrective measures to fix problems. Record dates of actions and any follow-up inspections. This will be important for communicating with Level 2 inspectors and/or the local stormwater program.
- Activate a Level 2 Inspection (**Section 3**) as guided by the table (shown in blue cells): These blue cells identify conditions when a more detailed inspection will be needed to further diagnose problems. As the problem becomes more severe, it will be necessary to activate a Level 2 inspection. Consult the local stormwater program authority for the most appropriate Level 2 inspection option.

| Permeable Pavement 1. Drainage Area | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and mulch areas of bare soil to get vegetation established.<br>☐ Fill in erosion areas with soil, compact, and seed straw to get vegetation established.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small bern or adding topsoil to area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |

Figure 2.2.1. Example of a Level 1 Inspection Checklist, with Follow-Up Actions. Note “Kick-Out to Level 2” highlighted in gray.

## 2.3. Rainwater Harvesting – Level 1 Inspections

### Components of Rainwater Harvesting

Key components to inspect for Rainwater Harvesting systems include the following:

- RWH 1. Conveyance System (gutters, downspouts, other pipes) and Filter
- RWH 2. Storage Tank
- RWH 3. Outlets

**Note:** The category of Rainwater Harvesting includes:

- *Rain Barrel* – A small tank, usually between 50 and 100 gallons that can be installed directly next to a downspout. Multiple rain barrels can be connected in order to increase rainwater storage capacity. This is the most common form of rainwater harvesting on residential properties.
- *Cistern* – A larger tank that can be installed above ground or below ground, depending on the structural capacity of the material.


Figure 2.3.1 Key Areas for Level 1 Inspection of Rainwater Harvesting Systems

## Rainwater Harvesting Level 1 Inspection

The Level 1 Inspection focuses on the Conveyance System and Filter (RWH 1), Storage Tank (RWH 2), and Outlet (RWH 3). It is recommended that this inspection be conducted two to four times per year, especially in spring and late fall. If possible, inspect the system during or immediately after a storm in order to better see any active blockages, leaks, or other problems.

### RWH 1. Conveyance System and Filter

Description: The conveyance system is all the components that collect and convey runoff from the roof toward the storage tank. This typically consists of gutters and downspouts, and sometimes additional drainage pipes. These components need to be kept clear of debris in order to avoid blockages and spilling of runoff out of the gutters. Every proper rainwater harvesting system also has one or more ways of filtering the water coming into the tanks from the conveyance system. These may include screens, first-flush diverters, and vortex filters.

Instruction: Inspect any gutters, downspouts, drainage pipes, and filters connected to the Rainwater Harvesting System. Consult **Table 2.3.1** below:

Figure 2.3.2 Inspecting the Conveyance System and a Vortex-style Filter

**Table 2.3.1 RWH Conveyance System and Filter**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Leaves, sticks, or other debris in gutters and downspouts | ☐ Remove all debris by hand.<br>☐ Other: |
| ☐ Leaves, sticks, or other debris in filter(s) | ☐ Clean out all debris and organic matter buildup by hand or by spraying with a hose.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Filter (first-flush diverter or vortex filter outside the tank) does not seem to be operating, is completely clogged, or does not appear to be trapping any debris. |
| ☐ Loose or disconnected junctions between gutters, pipes, or filters | ☐ Secure any loose junctions or parts and make sure they are properly sealed to prevent leaks,<br>☐ Other: |

## RWH 2. Storage Tank

Description: Many different types and sizes of tanks can be used for rainwater harvesting. They can be situated underground, above ground, or even partially buried. The tank body has an inlet (and/or cover) and one or more outlet points for water to leave the tank. Advanced rainwater harvesting systems usually also have a pump and a filter inside or outside the tank to further clean the stored water and pump it to the point of use.

Instruction: When the tank is full, carefully inspect for any leaks or blockages. Next, drain the tank to inspect interior. For safety reason, visually inspect the inside of the tank without breaking the plane of the opening with any body parts, as this is a confined space that should only be entered by those with special training. Consult **Table 2.3.2** below.

Figure 2.3.3 Inspecting the Storage Tank

**Table 2.3.2 RWH Storage Tank**

| **Problem (Check if Present)** | **Follow-Up Actions** |
|---|---|
| ☐ Tank is above ground and not freeze proof. | **Winterize the tank by performing the following steps:**<br>☐ Drain down water level in the tank before winter to avoid damage from freezing temperatures.<br>☐ Drain water from pipes and pumps.<br>☐ Disconnect conveyance pipes from the tank to enable roof runoff to bypass the tank during winter. |
| ☐ Tank is full between rain events (harvested water is not being used). | ☐ Drain down any remaining water in the tank before predicted rain events. |
| ☐ Mosquito larvae or other insects present in the water | ☐ Add mosquito dunks to water.<br>☐ Ensure that insect screens are installed on all openings and are properly sealed (inlet and outlets).<br>☐ Other: |
| ☐ Debris, algae, or organic matter accumulated in tank | ☐ Remove as much as possible, by hand.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: For large tanks that cannot easily be accessed for inspection and/or cleaning, defer to Level 2 Inspection. |
| ☐ Tank does not appear to fill fully even during large rains, or water level drops quickly after filling. | ☐ Kick-Out to Level 2 Inspection: Water is bypassing the tank and/or there are leaks in the tank wall. This will likely require special expertise to diagnose and fix. |
| ☐ Problems with pumps, filters, or other mechanical components | ☐ Kick-Out to Level 2 Inspection: This will likely require special expertise to diagnose and fix. |

### RWH 3. Outlets

Description: An above-ground rainwater harvesting tank usually has at least two outlets—one at the top of the tank where water overflows when the tank is full, and one near the bottom of the tank for delivering the stored water by gravity feed. Many filters also have an outlet pipe to divert the first flush of roof runoff away from the tank. Any overflow outlet that spills onto the ground should have sufficient erosion control (e.g., rock or stone pad) to prevent erosion of the ground.

Instruction: Examine the outlet pipe(s) and the point at which it overflows onto the ground. Consult **Table 2.3.3** below.

**Table 2.3.3 RWH Outlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Slow flow from outlet caused by faulty or clogged valve | ☐ If clogging seems to be the problem, ream out sediment from valve if this can be done from exterior.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Valve needs to be replaced or cannot be cleaned out from outside of tank. |
| ☐ Flow from outlet is backing up toward building foundation. | ☐ Add flexible pipe to end of outlet pipe to divert flow further away and downhill from building. |
| ☐ Erosion or drainage issues at outlet | ☐ Add a gravel and/or stone pad to reduce the impact from the water flowing out of the outlet pipe during storms.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Rills have formed, erosion or drainage problems are more severe or cannot be resolved, or there is discoloration or other unusual conditions around the outlet. |

## 2.4. Disconnection and Sheetflow

### Components of Disconnection and Sheetflow

The intent of disconnection and sheetflow is for runoff from small areas of impervious cover to spread out evenly and dissipate in a grassy or vegetated area. It is a low-technology practice intended to reduce runoff at its source. Key components to inspect for Disconnection and Sheetflow include the following:

- D&S 1. Drainage Area
- D&S 2. Level Spreader/Energy Dissipator
- D&S 3. Treatment Area


Figure 2.4.1 Key Areas for Level 1 Inspection of Disconnection and Sheetflow with filter strip shown.

R. Winston, NCSU

**Note:** The category of Disconnection and Sheetflow includes:

- Rooftop Disconnection – Runoff from a small rooftop is directed to a relatively flat pervious area.
- Sheetflow to Filter Strip – Runoff from a small parking lot, sidewalk, or other small impervious surface is directed to a relatively flat, uniformly graded grassy area.
- Sheetflow to Riparian Buffers – Runoff from a small parking lot, sidewalk, or other small impervious surface is directed to a relatively flat, well-vegetated riparian area.

## Disconnection and Sheetflow Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (D&S 1), Level Spreader/Energy Dissipater (D&S 2), and Treatment Area (D&S 3). This inspection should be conducted twice per year, preferably in the spring and fall. If possible, inspect the practice during a storm in order to better see any active blockages, bypassing, or other problems.

### D&S 1. Drainage Area

Description: The drainage area consists of rooftops and/or impervious surfaces such as parking lots, driveways, or sidewalks. Pervious areas such as lawns or forests may also be part of the drainage area.

Instruction: Visually inspect any surfaces in the drainage area. Consult **Table 2.4.1** below.

**Table 2.4.1 D&S Drainage Area**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Changes in flow; more runoff; runoff bypassing the practice | ☐ For rooftop areas, make sure downspouts are still disconnected and conveying water into the treatment area.<br>☐ Look for and remove any “dams” of sediment and grass clippings that prevent water from entering the treatment area as sheet flow.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Changes to drainage area size or amount of runoff due to construction, tillage, etc. |
|  | ☐ For parking lots in the drainage area—sediment, grass clippings, or other debris has accumulated at pavement edge. | ☐ For small, isolated amounts of debris, sweep up by hand and dispose properly so that it will not be exposed to runoff.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Sediment is widespread and cannot be removed by manual sweeping. |
|  | ☐ For parking lots in the drainage area—dips or damage at pavement edge caused flow to concentrate. | ☐ Kick-Out to Level 2 Inspection: This will likely require special expertise to diagnose and fix pavement edge. |

## D&S 2. Level Spreader/Energy Dissipator

Description: Some disconnection and sheetflow practices have a structure in place to dissipate any concentrated runoff and turn it into sheet flow. This may consist of a stone or gravel spreader a concrete or wood level spreader, or other level and stable surface.

Instruction: Inspect the energy dissipator closely, during a rain event if possible. Consult the **Table 2.4.2** below.

**Table 2.4.2 D&S Level Spreader/Energy Dissipator**

| **Problem (Check if Present)** | | **Follow-Up Actions** |
|---|---|---|
|  | ☐ Debris and/or sediment accumulated behind or around the level spreader. | ☐ Remove debris and sediment by hand and ensure that the area behind the level spreader is relatively flat. Too much debris and sediment can cause runoff to bypass the level spreader structure.<br>☐ Other: |
|  | ☐ Sinking, cracking, sloughing, or other structural problem makes the energy dissipator no longer level. | ☐ For stone/gravel spreaders, add new material or rake out as needed to make it even.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Structural issues that cannot be easily fixed by hand |

### D&S 3. Treatment Area

Description: After runoff is dissipated as sheet flow, it enters the treatment area–a relatively flat grassy or vegetated area.

Instruction: Examine where flow enters the treatment area as well as the whole flow path. Look for signs of concentrated flow. Consult the table below.

**Table 2.4.3 D&S Treatment Area**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
| ☐ Trash and/or debris in the treatment area | | ☐ Collect trash/debris and dispose of properly. |
|  | ☐ Grass filter strip has grown very tall, to the point that runoff cannot easily enter or is getting concentrated. | ☐ Mow filter strip twice a year or more frequently in a residential yard. |
| ☐ Sparse vegetation or bare spots | | ☐ For grassy areas, add topsoil (as needed), grass seed mulch, and water during the growing season to re-establish consistent vegetation cover.<br>☐ Other: |
|  | ☐ Rills or gullies are forming in treatment area where flow has become concentrated | ☐ For minor rills, fill in with soil, compact, and add seed and straw to establish vegetation.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Rills are more than 2" to 3" deep and require more than just hand raking and re-seeding. |

## 2.5. Swales

### Areas of Swales

- Key areas to inspect for swales include the following:
- SW 1. Drainage Area
- SW 2. Inlets
- SW 3. Swale Surface Area
- SW 4. Vegetation
- SW 5. Outlets

**Note:** The category of Swales includes:

- Vegetated Swale – shallow channel densely planted with variety of grasses, shrubs, and/or trees (also called bioswale or drainage swale)
- Wet Swale – a cross between a wetland and a swale, this linear system intercepts groundwater to maintain wetland vegetation

For the purposes of this chapter, the term "Swale" will be used to generally describe these practices.

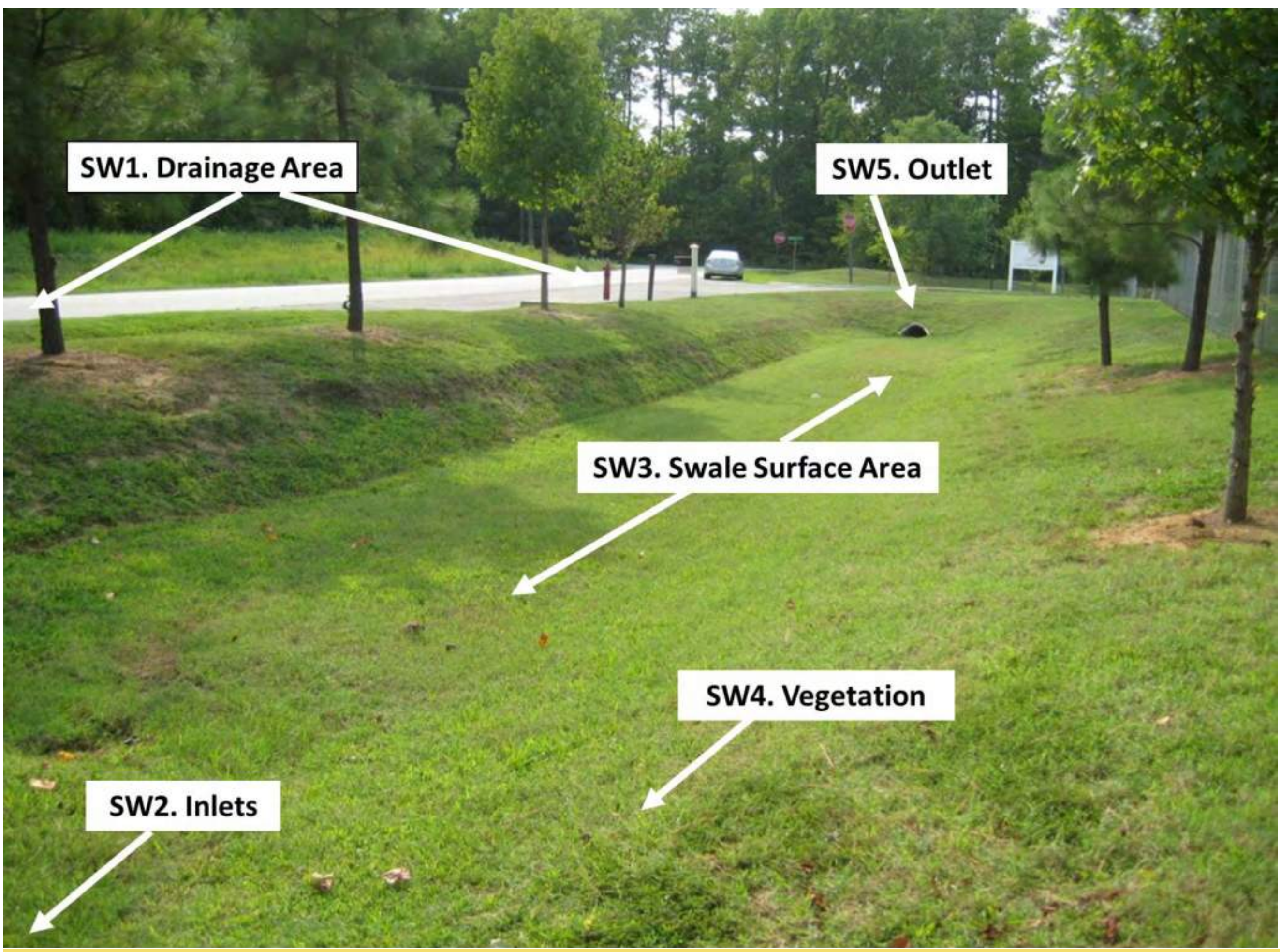



Figure 2.5.1 Key Areas for Level 1 Inspection of Swales Credit

## Swale Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (SW1), Inlets (SW2), Swale Surface Area (SW3), Vegetation (SW4), and Outlets (SW5). This inspection should be conducted on a regular basis, with an early spring inspection to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow. An inspection during the growing season or in the early fall is also recommended to check on the health of vegetation.

### SW 1. Drainage Area

Description: The drainage area sends runoff to and is uphill from the swale. When it rains, water runs off and flows to and along the swale.

Instruction: Look for areas that are uphill from the swale. Consult **Table 2.5.1** below.

**Table 2.5.1 SW Drainage Area**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and mulch or sod areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and add seed and straw to establish vegetation.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
| ☐ Open containers of oil, grease, paint, or other substances | | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous. |
|  | | Kick-Out to Level 2 Inspection: Grass on edge of pavement continues to die off for unknown reasons. Swale edge may need to be replaced with other materials (e.g., stone diaphragm). |
| ☐ Grass dying at edge of road | | ☐ Seed and mulch; add topsoil or compost if needed.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Grass on edge of pavement continues to die off for unknown reasons. Swale edge may need to be replaced with other materials (e.g., stone diaphragm). |

### SW 2. Inlets

Description: The inlets to a swale are where water flows in. Depending on the design, water can flow in through:

- Ditch, pipe, or curb opening at top of swale: This is the most common approach, where water enters the swale at the top.
- Along the entire edge of the swale: If the swale is along a roadway or parking lot, water may enter along the long side of the swale through defined curb openings or simply by water flowing into the swale from the pavement edge (known as "sheetflow").

Instruction: Stand in the swale and look for all the places where water flows in. Consult **Table 2.5.2** below for possible problems.

**Table 2.5.2 SW Inlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Inlets or the swale edge are collecting grit, grass clippings, or debris or have grass/weeds growing. Some water may not be getting into the swale. The objective is to have a clear pathway for water to flow into the swale. | ☐ Use a flat shovel to remove grit and debris (especially at curb inlets or opening). Parking lots will generate fine grit that will accumulate at these spots.<br>☐ Pull out clumps of growing grass or weeds, and scoop out the soil or grit that the plants are growing in.<br>☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets or along the edge of the swale where water is supposed to enter.<br>☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the swale.<br>☐ Dispose of all material properly in an area where it will not re-enter the swale.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the swale. |
|  ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion are present, or there is bare dirt that is washing into the swale. | ☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<br>☐ In some cases, reseeding and applying an erosion control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<br>☐ Other: |
| | ☐ Level 2 Inspection: Erosion is occurring at most of the inlets or along much of the swale edge. The inlet design may have to be modified. |

## SW 3. Swale Surface Area

Description: The swale surface area is the vegetated area where water flows during a storm and also the side slopes that slope down into the swale bottom. Depending on the design, the swale may also contain “check dams,” which are small dams made out of earth, stone, wood, or other materials. The check dams slow down and temporarily pond water as it flows down the swale.

Instruction: Examine the entire swale surface and side slopes. Consult **Table 2.5.3** below for possible problems.

**Table 2.5.3 SW Surface Area**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Minor areas of sediment, grit, trash, or other debris are accumulating in the swale. | ☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the swale.<br>☐ If removing the material creates a hole or low area, fill with good topsoil and add seed and straw to re-vegetate.<br>☐ Remove trash, vegetative debris, and other undesirable materials.<br>☐ If the swale is densely vegetated, it may be difficult to do the maintenance; check for excessive ponding or other issues described in this section to see if the accumulated material is causing a problem.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 3 inches deep and covers 25% or more of the swale surface.<br>☐ The source of sediment is unknown or cannot be controlled with simple measures. |
| <br>☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows through the swale or on the slopes. | ☐ Try filling the eroded areas with clean topsoil, and then seed and mulch to establish vegetation.<br>☐ If the problem recurs, you may have to use some type of matting, stone (e.g., river cobble), or other material to fill in eroded areas.<br>☐ If the erosion is on a side slope, fill with soil and cover with erosion-control matting or at least straw mulch after re-seeding. |
| | ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3 inches deep and seems to be an issue with how water enters and moves through the swale.<br>☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem. |
| ☐ Water does not flow evenly down the length of the swale, but ponds in certain areas for long periods of time (e.g., 72 hours after a storm). The swale does not seem to have “positive drainage.” Check during or immediately after a rain storm. | ☐ If the problem is minor (just small, isolated areas), try using a metal rake or other tools to create a more even flow path; remove excessive vegetative growth, sediment, or other debris that may be blocking the flow.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Water ponds in more than 25% of the swale for three days or more after a storm. The issue may be with the underlying soil or the grade of the swale.<br>☐ Water ponds behind check dams for three days or more after a storm. Check dams may be clogged or not functioning properly. |

| Table 2.5.3 SW Surface Area | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ Check dams (if present): water is flowing around the edges of check dams, creating erosion or sinkholes on the uphill or downhill side, or the check dams are breaking apart or breaching. | ☐ If the problem is isolated to just a few check dams, try simple repairs.<br>☐ It is very important for the center of each check dam (where most of the water flows) to be lower (by at least several inches) than the edges of the check dams where they meet the side slopes. Also, the check dams should be keyed into side slopes so water does not flow between the check dam and side slope.<br>☐ Use a level to check the right check-dam configuration, as noted above. Repair by moving around stone, filling and compacting soil, or adding new material so that water will be directed to the center of the check dam instead of the edges.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Many check dams are impacted and/or the problem seems to be a design issue with height, spacing, shape, or materials used to construct them. |

## SW 4. Vegetation

Description: The health of vegetation within the swale is perhaps the most critical maintenance item for the property owner or responsible party. Many vegetated swales become overgrown, and "desirable" vegetation becomes choked out by weeds and invasive plants. It is important to know what the swale is supposed to look like and what plants seem to be thriving or doing poorly. Periodic maintenance of vegetation will prevent larger problems that are more difficult and costly to manage.

Instruction: Examine the swale vegetation. Consult **Table 2.5.4** below for possible problems.

**Table 2.5.4 SW Vegetation**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Vegetation is too overgrown to access swale for maintenance activities | ☐ Mow or bush-hog the path.<br>☐ Other: |
| <br>☐ Vegetation requires regular maintenance: pulling weeds, removing dead and diseased plants, adding plants to fill in areas that are not well vegetated, etc. | ☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling.<br>☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water.<br>☐ Even vegetation that is intended to be present can become large, overgrown, block flow, and/or crowd out surrounding plants. Prune and thin accordingly.<br>☐ If weeds or invasive plants have overtaken the whole swale, bush-hog the entire area before seed heads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above.<br>☐ Replant with species that are aesthetically pleasing and seem to be doing well in the swale.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging. |
| ☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated. | ☐ The original plants are likely not suited for the actual conditions within the swale. If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., in residential yards), this task will likely require a landscape design professional or horticulturalist. |

### SW 5. Outlets

Description: These are where water leaves the swale when it fills up or where water reaches the downstream end of the swale. There may be a small stone apron or rock dam here or even an outlet grate.

Instruction: Examine outlets that release water out of the swale. Consult **Table 2.5.5** below for possible problems.

**Table 2.5.5 SW Outlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Outlet is obstructed with mulch, sediment, debris, trash, etc. | ☐ Remove the debris and dispose of it where it cannot re-enter the swale.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools. |

# 2.6. Tree Planting

## Tree Planting Actions for Maintenance

Key actions to take for tree planting maintenance include the following:

- TP1. Watering
- TP2. Mulch
- TP3. Pruning
- TP4. Disease or pests

**Note:** This is a simple, "non-structural" practice and, as such, maintenance tasks are similar to any landscape maintenance. Tree planting can involve individual trees or more, such as reforesting a riparian buffer.

For this type of practice, inspection is part of maintenance to check on the health of the trees.

Figure 2.6.1. Key Areas for Inspection and Maintenance for Tree Planting

## Tree Planting Level 1 Inspection

The Level 1 Inspection goes hand in hand with active maintenance and includes watering (TP1), mulching (TP2), and Pruning (TP3). Watering should occur during the growing season. Mulching and pruning occurs once a year in the spring and early spring, respectively.

### TP 1. Watering

Description: Proper water management is perhaps the most crucial maintenance activity to ensure survival of newly planted trees. Watering is essential during periods of drought, while over watering can be fatal. Watering options include regular or soaker hoses, sprinklers, buckets, drip irrigation, or installation of larger capacity watering tanks for irrigation systems. Consult the maintenance plan for instructions on the timing, volume, and method of watering that is appropriate for the specific species of trees.

Instruction: Inspect the trees to determine whether they need watering. Consult **Table 2.6.1** below.

**Table 2.6.1 TP Watering**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Soil is not moist to the touch and/or it has not rained in a week, and leaves/needles are starting to appear wilted/dry. | ☐ Water trees deeply and slowly near the base. Soaker hoses and drip irrigation work best for deep watering of trees and shrubs.<br>☐ Other: |

## TP 2. Mulch

Description: Mulching is a common method of weed control and moisture retention. Organic mulch should be spread over the soil surface and extend out to a radius of 5 feet or the tree drip line, whichever is less. Slowly decomposing organic mulches, such as shredded bark, compost, leaf mulch, or wood chips provide many added benefits for trees. Mulch that contains a combination of chips, leaves, bark and twigs is ideal for reforestation sites. Consult the maintenance plan for instructions on the timing, depth, and type of mulch application needed for the specific species of trees present.

Instruction: Mulch should be applied twice per year—in the late spring and during leaf fall.  Consult the table below for possible problems. Check the depth of mulch regularly. Rake the old mulch to break up any matted layers and to refresh the appearance. Consult **Table 2.6.2** below.

**Table 2.6.2 TP Mulch**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Mulch is too thin or thick (should be approximately 3" deep) or does not extend to tree canopy (or 5' radius if tree has a larger than 10' canopy reach). | ☐ Add or remove mulch around tree canopy to maximum 5' radius but not within 3" of the bark.<br>☐ If mulch is against the stems or tree trunks, pull it back several inches to expose the base of the trunk and root crown.<br>☐ Other: |

## TP 3. Pruning

Description: Pruning is usually not needed for newly planted trees but may be beneficial for tree structure in older trees. If necessary, prune only dead, diseased, broken or crossing branches at planting. As the tree grows, lower branches may be pruned to provide clearance above the ground or to remove dead or damaged limbs that sprout from the trunk.

- Instruction: Examine the branches and tree shape. Consult Table 2.6.3 below for possible problems.

**Table 2.6.3  TP Pruning**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Presence of suckers, dead or diseased branches, branches that interfere with pedestrian traffic | ☐ Selective cutting<br>☐ Prune to make the tree more aesthetically pleasing and remove disease.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Use an arborist or landscaper for more extensive pruning jobs. |

## 2.7. Bioretention

### Areas of Bioretention

Key areas to inspect for Bioretention include the following:

- BR 1. Drainage Area
- BR 2. Inlets
- BR 3. Bioretention Ponding Area
- BR 4. Vegetation
- BR 5. Outlets

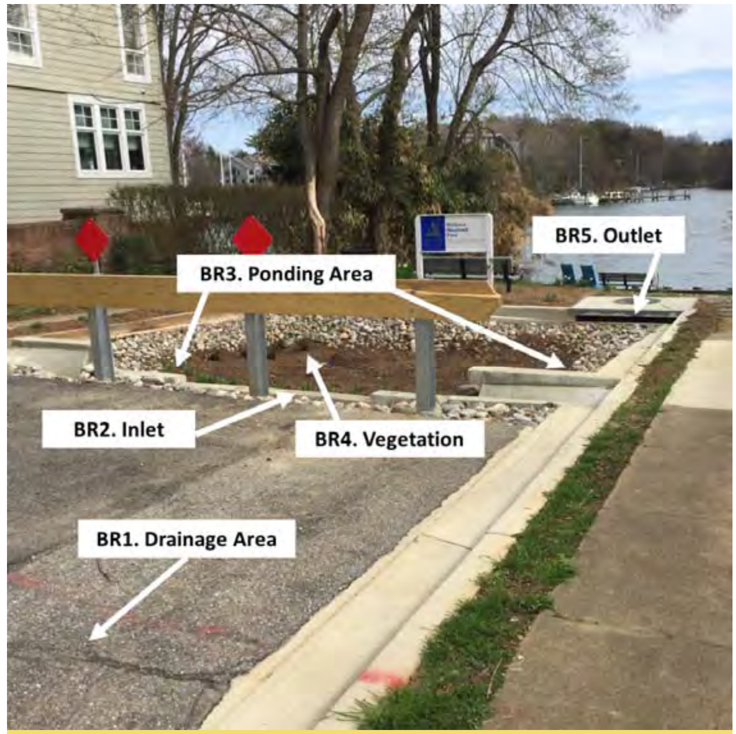



**Figure 2.7.1.** Key Areas for Level 1 Inspection of Bioretention

**Note:** The category of Bioretention includes:

- Bioretention cells – areas of soil, mulch, and vegetation that treat runoff
- Dry swales – long, linear bioretention cells, sometimes with check dams along a mildly sloping swale
- Rain gardens – usually small-scale bioretention practices on residential or small commercial properties
- Stormwater planters – usually in more urban settings, with soil and plants in a concrete box that receives roof runoff or perhaps other water from the site
- Tree pits – also a more urban practice where the bioretention is confined within some sort of box (e.g., concrete) and places along road curbs or other areas to treat runoff

For the purposes of this chapter, the term “Bioretention cell” will be used to generally describe these practices.

## Bioretention Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (BR1), Inlets (BR2), Bioretention Ponding Area (BR3), Vegetation (BR4), and Outlets (BR5). This inspection should be conducted on a regular basis, with an early spring inspection to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow. An inspection during the growing season or in the early fall is also recommended to check on the health of vegetation.

### BR 1. Drainage Area

Description: The drainage area sends runoff to and is uphill from the Bioretention cell. When it rains, water runs off and flows to the Bioretention cell and ponds within the cell temporarily (usually for no more than 48 hours). Sometimes, the runoff will contain dirt, grit, grass clippings, oil, or other substances that SHOULD NOT be directed to the Bioretention area.

Instruction: Look for areas that are uphill from the Bioretention cell. Consult **Table 2.7.1** below.

**Table 2.7.1 BR Drainage Area**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and mulch areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  | ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

### BR 2. Inlets

Description: The inlets to a Bioretention cell are where water flows into the cell. Depending on the design, water can flow in through:

- Curb cuts or openings in a parking lot or roadway
- Pipes or ditches that carry water into the Bioretention cell from the drainage area
- Flow directly over the land surface (known as “sheetflow”), sometimes across a strip of rock or stone

*Curb cut – flow enter through defined place in curb*

*Curb cut*

*Gravel diaphragm – flow enters as sheetflow and is evenly distributed across length of practice*

*Grass filter strip: accepts sheet flow from the parking lot*

Figure 2.7.2 Bioretention Cell Inlets

CSN, 2013

Instruction: Stand in the Bioretention cell itself and look for all the places where water flows in. Often there will be multiple points of inflow to the practice. Consult **Table 2.7.2** below for possible problems.

| Table 2.7.2 BR Inlets | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ Inlets collect grit and debris or grass/weeds. Some water may not be getting into the Bioretention cell. The objective is to have a clear pathway for water to flow into the cell. | ☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots.<br>☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in.<br>☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets.<br>☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Bioretention cell.<br>☐ Dispose of all material properly where it will not re-enter the Bioretention cell.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Bioretention cell. |
| <br>☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Bioretention cell. | ☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<br>☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets, and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified. |

## BR 3. Bioretention Ponding Area

Description: The ponding area fills up with water during a rainstorm. If you picture the Bioretention cell as a bathtub, there is the *bottom* (usually flat surface), *side slopes* (areas that slope down to the bottom from the surrounding ground), and *berms or structures that control the depth to which water ponds.*

Instruction: Examine the entire Bioretention surface and side slopes. Consult the table below for possible problems.

**Table 2.7.3 BR Ponding Area**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Mulch (if used) needs to be replaced or replenished. The mulch layer had decomposed or is less than 1-inch thick. | ☐ Add new mulch to a total depth (including any existing mulch that is left) of 2 to 3 inches. The mulch should be shredded hardwood mulch that is less likely to float away during rainstorms.<br>☐ Avoid adding too much mulch so that inlets are obstructed or certain areas become higher than the rest of the Bioretention surface.<br>☐ Other: |
| <br><br>☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the bottom. | ☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Bioretention cell.<br>☐ If removing the material creates a hole or low area, fill with soil mix that matches original mix and cover with mulch so that the Bioretention surface area is as flat as possible.<br>☐ Remove trash, vegetative debris, and other undesirable materials.<br>☐ Other:<br><br>☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the Bioretention surface.<br>☐ Kick-Out to Level 2 Inspection: The Bioretention cell is too densely vegetated to assess sediment accumulation or ponding; see BR-4, Vegetation. |

| | | |
|---|---|---|
| <br>☐ There is erosion in the bottom or on the side slopes. Water seems to be carving out rills as it flows across the Bioretention surface or on the slopes, or sinkholes are forming in certain areas.<br>☐ Source: Stormwater Maintenance, LLC. | ☐ Try filling the eroded areas with clean topsoil or sand, and cover with mulch.<br>☐ If the problem recurs, you may have to use stone (e.g., river cobble) to fill in problem areas.<br>☐ If the erosion is on a side slope, fill with clay that can be compacted and seed and mulch the area.<br>☐ Other: | ☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the Bioretention cell.<br>☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water, but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem. |
| <br>☐ The bottom of the Bioretention cell is not flat, and the water pools at one end, along an edge, or in certain pockets. The whole bottom is not uniformly covered with water. See design plan to verify that Bioretention surface is intended to be flat. Check during or immediately after a rainstorm. | ☐ If the problem is minor (just small, isolated areas are not covered with water), try raking the surface OR adding mulch to low spots to create a more level surface. You may need to remove and replace plantings in order to properly even off the surface.<br>☐ Check the surface with a string and bubble level to get the surface as flat as possible.<br>☐ Other: | ☐ Kick-Out to Level 2 Inspection: Ponding water is isolated to less than half of the Bioretention surface area, and there seem to be elevation differences of more than a couple of inches across the surface. |
| <br>☐ Water stands on the surface more than 72 hours after a rainstorm and /or wetland-type vegetation is present. The Bioretention cell does not appear to be draining properly. | | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

### BR 4. Vegetation

Description: The health of vegetation within the Bioretention cell is perhaps the most critical maintenance item for the property owner or responsible party. Many Bioretention cells become overgrown, and "desirable" vegetation becomes choked out by weeds and invasive plants. It is important to know what the Bioretention cell is supposed to look like and what plants seem to be thriving or doing poorly. Periodic maintenance of vegetation will prevent larger problems that are more difficult and costly to manage.

Instruction: Examine all Bioretention cell vegetation. Consult the table below for possible problems.

**Table 2.7.4 BR Vegetation**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Vegetation requires regular maintenance—pulling weeds, removing dead and diseased plants, replacing mulch around plants, adding plants to fill in areas that are not well vegetated, etc. | ☐ If you can identify which plants are weeds or not intended to be part of the planting plan, eliminate these, preferably by hand pulling.<br>☐ If weeds are widespread, check with the local stormwater authority and/or Extension Office about proper use of herbicides for areas connected with the flow of water.<br>☐ Even vegetation that is intended to be present can become large, overgrown, and/or crowd out surrounding plants. Prune and thin accordingly.<br>☐ If weeds or invasive plants have overtaken the whole Bioretention cell, bush-hog the entire area before seedheads form in the spring. It will be necessary to remove the root mat manually or with appropriate herbicides, as noted above.<br>☐ Re-plant with species that are aesthetically pleasing and seem to be doing well in the Bioretention cell.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: You are unsure of the original planting design, or the vegetation maintenance task is beyond your capabilities of time, expertise, or resources. If you are unsure of the health of the vegetation (e.g. salt damage, invasives, which plants are undesirable) or the appropriate season to conduct vegetation management, consult a landscape professional before undertaking any cutting, pruning, mowing, or brush hogging. |
| <br>☐ Vegetation is too thin, is not healthy, and there are many spots that are not well vegetated. | ☐ The original plants are likely not suited for the actual conditions within the Bioretention cell. If you are knowledgeable about plants, select and plant more appropriate vegetation (preferably native plants) so that almost the entire surface area will be covered by the end of the second growing season.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: For all but small practices (e.g., rain gardens), this task will likely require a landscape design professional or horticulturalist. |

### BR 5. Outlets

Description: Outlets are where water leaves the Bioretention cell when there is too much ponded water. There are various ways that outlets are configured. They can be a yard drain type of structure in the Bioretention cell itself or a rock weir where water flows during large storms. Many Bioretention practices have an underdrain, which is like a French drain, that helps the Bioretention cell drain properly after storms. The underdrain pipe may “daylight” (come to the ground surface) at some point downhill from the Bioretention cell.

Instruction: Examine outlets that release water out of the Bioretention cell. Consult the table below for possible problems.

**Table 2.7.5 BR Outlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Erosion at outlet | ☐ Add stone to reduce the impact from the water flowing out of the outlet pipe or weir during storms.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Rills have formed and erosion problem becomes more severe. |
| <br>☐ Outlet obstructed with mulch, sediment, debris, trash, etc. | ☐ Remove the debris and dispose of it where it cannot re-enter the Bioretention cell.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Outlet is completely clogged or obstructed; there is too much material to remove by hand or with simple hand tools. |

## 2.8. Green Roof

### Areas of the Green Roof

Key areas to inspect for green roofs include the following:

GR 1. Vegetation and Surface
GR 2. Overflows and Drains

**Note:** Green Roofs consist of green infrastructure practices applied on rooftops, wherein stormwater is filtered through a vegetated planting bed. Green Roofs are a unique practice in that they are often covered by a professional ongoing maintenance contract, and their design is highly variable depending on the specific product. This section highlights some key inspection items.


**Figure 2.8.1.** Key Areas for Level 1 Inspection of Green Roof

## Green Roof Level 1 Inspection

The Level 1 Inspection focuses on the Vegetation (GR1), Overflows and Drains (GR2), and the Surface and Soil Medium (GR3). This inspection should be conducted on a regular basis, with an early spring inspection to ensure that the practice has survived the winter, particularly if there has been a cold year.

On a routine basis, the Level 1 Inspector should also ensure that the vegetation is surviving any harsh roof conditions, particularly during dry periods.

### GR 1. Vegetation and Surface

Description: The green roof vegetation usually consists of succulent plants, such as sedums, and should form a dense cover over the course of several growing seasons.

Instruction: Visually inspect the surface and vegetation of the practice. Consult **Table 2.8.1** below:

**Table 2.8.1 GR Vegetation and Surface**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Wilting or nutrient-deprived vegetation; bare areas developing on the roof | ☐ Water or irrigate.<br>☐ Prune or remove dead or dying vegetation.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Greater than 20% plant dieoff or wilting, even after rainy periods. May require new vegetation or indicate a problem with the soil medium.<br>☐ Kick-Out to Level 2 Inspection: Yellowing vegetation may indicate a need for fertilizer, but do not fertilize unless explicitly included in the management plan or with a Level 2 Inspection.<br>☐ Kick-Out to Level 2 Inspection: Bare areas with no vegetation growing. These may become weed problems in the future. |
| <br>☐ Weeds or moss | ☐ Remove weeds by hand.<br>☐ Apply lime to kill moss.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Weeds cover more than 25% of the surface, or the original planting plan has been compromised. |
| ☐ Ponding between storm events | ☐ Kick-Out to Level 2 Inspection: Surface ponding more than 24 hours after a storm event presents a hazard and needs to be addressed immediately. |

### GR 2. Overflows and Drains

Description: Green roofs typically drain through a network of underdrains to outlet at roof drainage infrastructure. These drainage structures need to be inspected and cleaned periodically to ensure that the medium drains properly.

Instruction: Review the specific maintenance plan for this practice to determine where inspection ports are. Remove the cover and inspect the port.

**Table 2.8.2 GR Overflows and Drains**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Inspection port for roof drainage (can be clogged with debris) | ☐ Remove debris by hand or flush through with a hose.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Debris cannot be removed, or it appears that debris has accumulated in the underdrains. |
| ☐ Damage to other roof drainage structures (e.g., roof scuppers) | ☐ Call contractor or individual in charge of regular building maintenance. This is a building maintenance issue.<br>☐ Other: |

## 2.9. Permeable Pavement

### Areas of Permeable Pavement

Key areas to inspect for permeable pavement include the following:

- PP1. Drainage Area
- PP2. Pavement Surface

**Note:** Permeable pavements include several materials, including porous asphalt materials, which appear similar to an asphalt parking lot, permeable concrete, and "interlocking concrete pavers," which are individual paving blocks. References to removing and replacing individual blocks of pavement refer only to this last category.


**Figure 2.9.1.** Key Areas for Level 1 Inspection of Permeable Pavement

### Permeable Pavement Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (PP1) and the Pavement Surface (PP2). This inspection should be conducted on a regular basis, with an early spring inspection to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow.

On a routine basis, the Level 1 Inspector should also ensure that the pavement area and its drainage are properly managed. Some key activities to avoid include:

1. Applying sand during winter months
2. Certain types of permeable pavement should not be plowed with steel-bladed plows.
3. Poor management of dumpsters
4. Storing or placing dirt, grit, mulch, sand, or other similar materials on or near the pavement surface

## PP 1. Drainage Area

Description: The drainage area sends runoff to the Permeable pavement area and is uphill from the Permeable pavement. When it rains, water runs off and flows to the Permeable pavement area, and it may pond there temporarily.

Instruction: Look for areas that are uphill from the Permeable pavement. Consult **Table 2.9.1** below:

**Table 2.9.1 PP Drainage Area**

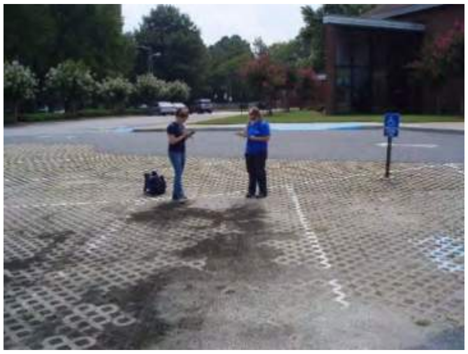
| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  | ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## PP 2. Permeable Pavement Surface

Description: The surface of the Permeable pavement should be relatively clean (not a lot of dirt and grit on the surface), free of cracks and broken pavement, and should NOT hold water after a rainstorm for more than a few hours.

Instruction: Examine the entire permeable pavement surface. Consult **Table 2.9.2** below for possible problems.

**Table 2.9.2 PP Surface**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Dirt and grit accumulating on pavement surface | ☐ For small areas (e.g., driveways, patios), try a leaf blower or sweep the area to remove the dirt/grit from the Permeable pavement and properly dispose of the material.<br>☐ If dirt/grit remain in the joint areas between paver blocks, agitate with a rough brush and vacuum the surface with a wet/dry vac.<br>☐ Remove and replace clogged blocks in segmented pavers.<br>☐ For larger areas (e.g., parking lots, courtyards), hire a vacuum sweeper to restore the surface to a cleaner condition.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Grit is widespread and cannot be removed by manual sweeping. |
|  | ☐ Grass and weeds are growing on the permeable pavement surface (applies only to pavement types that are not intended to be covered in vegetation). | ☐ If paver type is not intended to be covered in vegetation, remove the grass/weeds either mechanically (pulling, by hand or with a flame weeder) or with a herbicide approved for use in or near water (consult your local Extension Office for suggestions).<br>☐ Follow the actions listed above for removing dirt/grit from the pavement surface.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Grass/weeds cover more than 25% of surface area. |
|  | ☐ Slumping, sinking, cracking, or breaking of the pavement surface<br>*(Source: CSN, 2013)* | ☐ For small areas (e.g., patios, small driveway), it may be possible to remove the damaged pavers, check and fill in the underlying gravel, and replace with new materials.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Problem affects more than a small, isolated area. Will typically require a qualified contractor to fix it.<br>☐ Problem recurs or occurs in multiple small locations. |
|  | ☐ Water stands on Permeable pavement for days after a rainstorm; the Permeable pavement is clogged and doesn't let water through.<br>*(Source: CSN, 2013)* | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

## 2.10. Ponds and Wetlands

### Areas of Ponds and Wetlands

Key areas to inspect for ponds and wetlands include the following:

- PO 1. Drainage area
- PO 2. Inlet pipes and swales
- PO 3. Pond area and embankments
- PO 4. Pond outlet

**Note:** This category includes the following practices:

- *Wet ponds* – have a permanent pool of water and may be divided into various "cells"
- *Stormwater wetlands* – have a variety of depth zones ranging from deep pools to shallow wetlands and are characterized by wetland vegetation

It is recommended strongly to have as-built drawings and copies of previous inspections at hand, if available. Aerial photos may be needed to help direct the inspector to the pond or wetland location if it is obscured by vegetation.

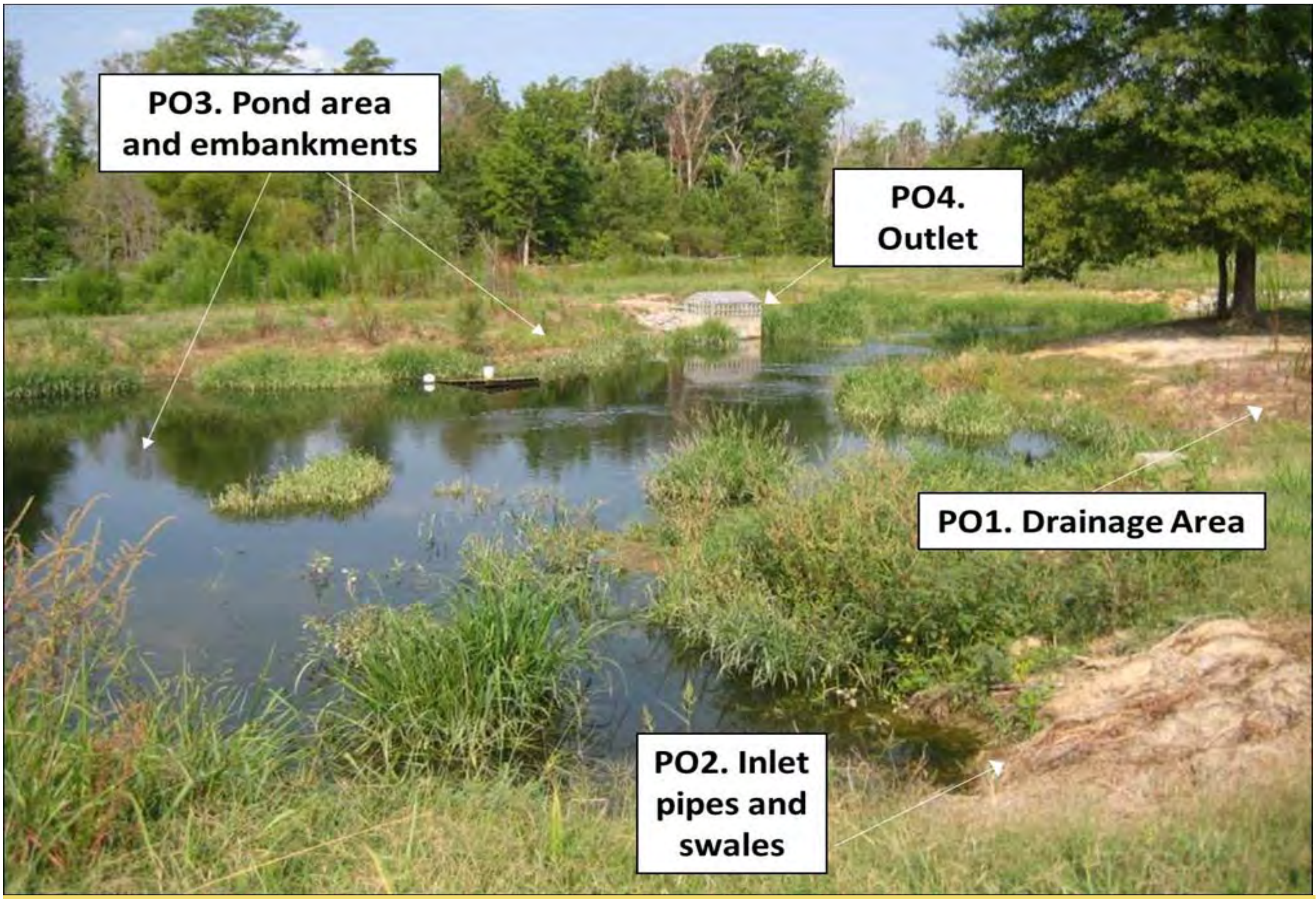



**Figure 2.10.1.** Key Areas for Level 1 Inspection of a Pond/Wetland

## Pond and Wetland Level 1 Inspection

The Level 1 Inspection focuses on the drainage area (PW 1), inlet pipes or swales (PW 2), pond area and embankments (PW 3) and pond outlet structures and outfall (PW 4). This inspection should be conducted on a regular basis to ensure that a buildup of trash, vegetation, or sediment does not interfere with the pre-treatment, pond or wetland, and the outfall's normal flow or function. Pond embankments and dams should be regularly inspected for evidence of erosion, burrowing or tunneling animals, and large woody vegetation growing on the dam.

### PW 1. Drainage Area

Description: The drainage area conveys runoff to and is uphill from the pond inlet. When it rains, water runs off through roof drains, yard drains, parking lots, roadways and underdrains to the ponds. Flow is through underground piping systems, overland via swales, or across the ground as sheetflow. Sometimes, the runoff will contain dirt, grit, grass clippings, leaves and woody debris that can collect in the drainage system. If left alone, blockages can occur and increase the chance of shallow flooding or standing water. Standing water in drainage systems foster mosquitos, pipe corrosion, and possible nuisance and odor conditions.

Instruction: Look for areas that are uphill from the pond. Consult **Table 2.10.1** below:

**Table 2.10.1 PW Drainage Area**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in eroded areas with soil, compact, seed and mulch with straw to establish vegetation.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ If large areas of soil have been eroded or larger channels are forming, this may require rerouting of flow paths or use of an erosion-control seed mat or blanket to reestablish acceptable ground cover or anchor sod where it is practical. |
|  ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Remove excessive vegetation or woody debris that can block drainage systems.<br>☐ Other: |
|  ☐ Open containers of oil, grease, paint, or other substances exposed to rain in the drainage area | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## PW 2. Pond Inlets

Description: Free, unobstructed flow from the drainage area to stormwater ponds is necessary to prevent shallow flooding and even structural damage from flooding. Pond inlets can consist of pipes, ditches, swales, or other means to convey stormwater to the pond or wetland.

Instruction: Look for all areas where water flows into the pond during storms. Note that there may be multiple points of inflow and types of structures (e.g., pipes, open ditches, etc.). Consult **Table 2.10.2** below:

**Table 2.10.2 Pond Inlets**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|   | ☐ Inlets are buried, covered or filled with silt, debris, or trash, or blocked by excessive vegetation. | ☐ If the problem can be remedied with hand tools and done in a safe manner, remove vegetation, trash, woody debris, etc. from blocking inlet structures.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 or 3 Inspection: If the amount of material is too large to handle OR there are ANY safety concerns about working in standing water, soft sediment, etc., the work will likely have to be performed by a qualified contractor. |
|  | ☐ Inlets are broken, and, with pieces of pipe or concrete falling into the pond, there is erosion around the inlet, there is open space under the pipe, or there is erosion where the inlet meets the pond | ☐ Kick-Out to Level 2 Inspection: These types of structural or erosion problems are more serious and will require a qualified contractor to repair. |

### PW 3. Pond Area and Embankments

Description: The pond area and embankment can consist of the following elements:

- Pre-treatment cell or small holding area where water first flows into the pond from the various inlets. These are commonly referred to as "forebays" and will be demarcated from the main pond area by small dams made of earth or rock. The purpose of forebays is to capture some of the sediment and pollutants before they reach the deep pool, making maintenance easier over time. Not all ponds will have forebays.
- The pond surface can be open water or a combination of open water and areas with wetland vegetation. Sometimes there is a shallow bench around the perimeter of a pond, known as an "aquatic bench."
- The "side slopes" are areas around the perimeter of the pond where the surrounding land slopes down to the pond surface.
- Most ponds will have a "riser structure," where the water exits a pond during storms. This can be a concrete or metal pipe that is open at the top, often with some type of trash rack. Some ponds also have an "emergency spillway," which is an open, rock-lined channel that carries water from large storms safely across the embankment.
- The dam or embankment holds water in the pond and is constructed of compacted soil, such as clay. There is often a pipe through the embankment that carries water from the riser structure safely through the embankment to the downstream channel.

The pond's pre-treatment areas or forebays should not be choked with vegetation or full of sediment. Removal of excessive vegetation and sediment and selective replanting are often annual maintenance activities.

Likewise, the pond's deep pool should not to be choked with vegetation or filled with sediment. Vegetation and sediment bars can restrict flow and cause short circuiting that reduces capture of sediment. Pond volume is to be maintained at the original design capacity and free of sediment bars or debris piles. Sometimes ponds are over-maintained and have no vegetation. Algae and turbidity (muddy water) are common problems in many ponds.

Instruction: Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

**Table 2.10.3 PW Pond Area and Embankments**

| **Problem (Check if Present)** | | **Follow-Up Actions** |
|---|---|---|
|  | ☐ The pretreatment area(s) or forebay(s) are filled with sediment, trash, vegetation, or other debris. | ☐ If the problem can be remedied with hand tools and done in a safe manner, use a flat shovel or other equipment to remove small amounts of sediment.<br>☐ Remove trash and excessive vegetation from forebays if this can be done in a safe manner.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Large amounts of sediment or debris will have to be removed by a qualified contractor. ANY condition that poses a safety concern for working in standing water or soft sediments should be referred to a Level 2 Inspection or qualified contractor. |

## Table 2.10.3 PW Pond Area and Embankments

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ The pond area itself has accumulated sediment, trash, debris, or excessive vegetation that is choking the flow of the water, OR the pond area is covered with algae or aquatic plants. | ☐ Level 1 includes handling only small amounts of material that can be removed by hand, or with rakes or other hand tools. Do not attempt any repair that poses a safety issue.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Most cases will call for a Level 2 Inspection and/or a qualified contractor.<br>☐ You are not sure what type and amount of vegetation is supposed to be in the pond.<br>☐ The algae or aquatic plants should be identified so that proper control techniques can be applied. |
|  | ☐ The side slopes of the pond are unstable, eroding, and have areas of bare dirt. | ☐ If there are only minor areas, try filling in small rills or gullies with topsoil, compacting, and seeding and mulching all bare dirt areas with an appropriate seed. Alternatively, try using herbaceous plugs to get vegetation established in tricky areas, such as steep slopes.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Erosion and many bare dirt areas on steep side slopes will require a Level 2 Inspection and repair by a qualified contractor. |
| <br> | ☐ The riser structure is clogged with trash, debris, sediment, vegetation, etc., OR is open, unlocked, or has a steep drop and poses a safety concern. The pond level may have dropped below its "normal" level. | ☐ If you can safely access the riser on foot or with a small boat, clear minor amounts of debris and remove it from the pond area for safe disposal.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: The riser cannot be accessed safely, the amount of debris is substantial, or the riser seems to be completely clogged and the water level has risen too high.<br>☐ There are safety issues with the riser and concern about access to pipes, drops, or any other life safety concern.<br>☐ The riser is leaning, broken, settling or slumping, corroded, eroded or any other structural problem. |

| Table 2.10.3 PW Pond Area and Embankments | | |
|---|---|---|
| **Problem (Check if Present)** | | **Follow-Up Actions** |
|  | ☐ The dam/embankment is slumping, sinking, settling, eroding, or has medium or large trees growing on it. | ☐ If there are small isolated areas, try to fix them by adding clean material (clay and topsoil) and seeding and mulching.<br>☐ Periodically mow embankments to enable inspection of the banks and to minimize establishment of woody vegetation.<br>☐ Remove any woody vegetation that has already established on embankments.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Most of these situations will require a Level 2 Inspection or evaluation and repair by a qualified contractor. Seepage through the dam or problems with the pipe through the dam can be a serious issue that should be addressed to avoid possible dam failure. |
|  | ☐ The emergency spillway or outfall (if it exists) has<br>☐ erosion, settlement, or loss of material. Rock-lined spillways have excessive debris or vegetation. | ☐ Clear light debris and vegetation.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Displacement of rock lining, excessive vegetation and erosion/settlement may warrant review and decision by Level 2 Inspector to check against original plan.<br>☐ Any uncertainty about the integrity of the emergency spillway should be referred to a Level 2 Inspector.<br>☐ Erosion or settlement such that design has been compromised should be reviewed by an engineer. |

### PW 4. Pond Outlet

Description: The pond’s outlet enables the ponded water to discharge to downstream drainage systems or stream channels. The outlet is often at the base of the dam/embankment on the downstream side. Inspection of this point can help prevent flooding of the pond and upstream drainage systems and prevent pond failure at a weak point of a pond’s containment system.

Instruction: Examine the outlet of the pipe on the downstream side of the dam/embankment where it empties into a stream, channel, or drainage system. Consult the table below for possible problems.

**Table 2.10.4 PW Pond Outlet**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ The pond outlet is clogged with sediment, trash, debris, vegetation, or is eroding, caving in, slumping, or falling apart. | ☐ If there is a minor blockage, remove the debris or vegetation to allow free flow of water.<br>☐ Remove any accumulated trash at the outlet.<br>☐ Outlet: |
| | ☐ Kick-Out to Level 2 Inspection:<br>☐ If the area at the outlet cannot be easily accessed or if the blockage is substantial, a Level 2 Inspection is warranted.<br>☐ Erosion at and downstream of the outfall should be evaluated by a qualified professional.<br>☐ Any structural problems, such as broken pipes, structures falling into the stream, or holes or tunnels around the outfall pipe, should be evaluated by a Level 2 Inspector and will require repair by a qualified contractor.<br>☐ The pool of water at the outlet pipe is discolored, has an odor, or has excessive algae or vegetative growth. |

## 2.11. Infiltration

### Areas of Infiltration

Key areas to inspect for Infiltration include the following:

- IN 1. Drainage Area
- IN 2. Inlets
- IN 3. Infiltration Area
- IN 4. Outlets

**Note:** The category of Infiltration includes:

- Infiltration Trench – Long, narrow infiltration practice, usually with small gravel at the surface and a reservoir of larger gravel or stone beneath
- Infiltration Basin – Larger practice, usually covered with grass and highly permeable soil beneath


**Figure 2.11.1** Key Areas for Level 1 Inspection of Infiltration Practice

- Dry Well – Small pit filled with stone or gravel, or precast concrete chamber surrounded by stone that receives and stores runoff to enable it to infiltrate into the underlying ground.

## Infiltration Level 1 Inspection

The Level 1 Inspection focuses on the Drainage Area (IN1), Inlets (IN2), Infiltration Area (IN3), and Outlets (IN4). The purpose of an infiltration practice is to temporarily store collected runoff so that it can percolate into the underlying soil. Using this practice is dependent on having a good on-site soil that is capable of infiltrating the amount of runoff generated by the drainage area. The Level 1 Inspection should be conducted at least twice a year, especially in early spring, to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow.

### IN 1. Drainage Area

Description: The drainage area conveys runoff to and is uphill from the Infiltration cell. When it rains, water runs off and flows to the Infiltration cell and soaks into its underlying layers.

Instruction: Look for both pervious and impervious areas that are uphill from the Infiltration cell. Consult **Table 11.1.1** below.

**Table 11.1.1 IN Drainage Area**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to get vegetation established.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
| ☐ For Dry Wells: Leaves, sticks, or other debris in gutters and downspouts | | ☐ Remove all debris by hand.<br>☐ Other: |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  | ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## IN 2. Inlets

Description: The inlets to an Infiltration practice are where water flows into the cell. Depending on the design, inlets can be:

- *Curb cuts or openings* in a parking lot or roadway
- *Downspouts* that deliver runoff directly from a rooftop to the Infiltration practice
- *Pipes or ditches* that carry water into the Infiltration practice from the drainage area
- *Flow directly over the land surface* (known as “sheetflow”), sometimes across a strip of rock or stone

Instruction: Look for all the places where water flows into the Infiltration practice. Consult **Table 11.1.2** below for possible problems.

**Table 11.1.2 IN Inlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Inlets are collecting grit and debris or grass/weeds are growing. Some water may not be getting into the Infiltration practice. | ☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots.<br>☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in.<br>☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets.<br>☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Infiltration practice.<br>☐ Dispose of all material properly in an area where it will not re-enter the practice.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Infiltration practice. |
| ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Infiltration practice. | ☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<br>☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified. |

## IN 3. Infiltration Area

Description: The infiltration area is the area that collects water and allows it to seep into the underlying soil. Some infiltration areas also have a vertical perforated pipe called an *observation well,* which is used to view the water level in the infiltration practice after a storm. If the infiltration practice is working properly, the water in the observation well should be completely drained down within 2 to 3 days of a storm. Depending on the design, the infiltration area can be covered with grass, gravel, or stone.

Instruction: Examine the surface of the infiltration area and the observation well. Consult **Table 11.1.3** below for possible problems. Note: The following Problem and Follow-Up Actions apply to infiltration practice pretreatment areas also.

**Table 11.1.3 IN Infiltration Area**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ For grass-covered Infiltration practices: grass has grown very tall,<br>*(Photo credit: Stormwater Maintenance, LLC)* | ☐ Mow infiltration area at least twice per year.<br>☐ Other: |
| <br>☐ For grass-covered Infiltration practices: sparse vegetation cover or bare spots | ☐ Add topsoil (as needed), grass seed, straw, and water during the growing season to re-establish consistent grass coverage.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sparse vegetation cover can be a sign that the infiltration area is not infiltrating at the proper rate and water is standing too long after a storm. The surface may be saturated or squishy, and the conditions do not enable grass to grow. This situation should be evaluated by a Level 2 Inspection and likely corrected by a qualified contractor. |
| ☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the surface. | ☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Infiltration practice.<br>☐ If removing the material creates a hole or low area, rake the surface smooth and level.<br>☐ Remove trash, debris, and other undesirable materials.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the surface of the Infiltration area. |

| Table 11.1.3 IN Infiltration Area | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ There is erosion on the surface; water seems to be carving out rills as it flows across the surface of the Infiltration area or sinkholes are forming in certain areas. | ☐ For minor areas of erosion, try filling the eroded areas with clean topsoil, sand, or stone (whatever the existing cover is).<br>☐ If the problem recurs, you may have to use larger stone (e.g., river cobble) to fill in problem areas.<br>☐ Other:<br><br>☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the infiltration area.<br>☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water but a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem. |
| <br>☐ Observation well is damaged or cap is missing | ☐ Kick-Out to Level 2 Inspection: Requires replacing pipes or caps. |
| <br>☐ Water still visible in the observation well more than 72 hours after a rain storm. The Infiltration practice does not appear to be draining properly. | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

### IN 4. Outlets

Description: Outlets are where water exits the surface of the infiltration area during larger storms when the underground infiltration reservoir fills up and the excess water needs somewhere to go. Note that not all infiltration practices will have an identifiable outlet if the design is for all the water to infiltrate into the ground. Outlets may be a berm, stone weir, or pipe.

Instruction: Locate and inspect all outlets. Consult **Table 2.11.4** below for possible problems.

**Table 2.11.4 IN Outlets**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Outlet obstructed with sediment, debris, trash, etc. | ☐ Remove the debris and dispose of it where it cannot re-enter the infiltration area.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Outlet is completely obstructed; there is too much material to remove by hand or with simple hand tools. |
| ☐ Rills or gullies are forming at outlet. | ☐ For minor rills, fill in with soil, compact, and seed and straw to establish vegetation.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Rills are more than 2" to 3" deep and require more than just hand raking and re-seeding. |

# 2.12. Sand and Organic Filters

## Components of Sand and Organic Filters

Key areas to inspect for these types of practices include the following:

- SF 1. Drainage Area
- SF 2. Inlets and Pre-treatment
- SF 3. Filter Area

**Note:** The category of Sand and Organic Filters includes:

- Surface Sand Filters – Surface sand filters (Figure 2.12.1) have a sand layer and often an underdrain layer beneath. Water comes in on the surface.
- Underground Sand Filters – Sand filters can also be in an underground vault or concrete trench in a parking lot or near a building. These are typically accessed through manholes or heavy grates.

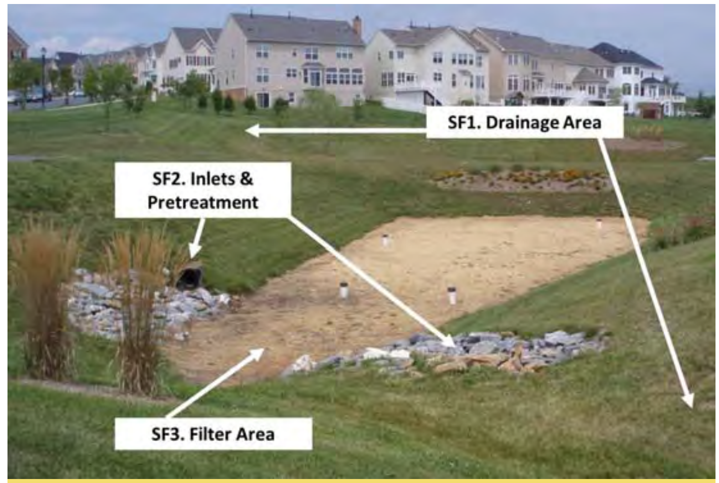



**Figure 2.12.1.** Key Areas for Level 1 Inspection of Sand and Organic Filters

- Underground Organic Filters – These are similar to underground sand filters but may also contain canisters of peat or other organic media that helps filter pollutants from runoff. These types of underground structures will be difficult for Level 1 Inspectors to inspect because they involve pulling off heavy manhole covers or grates. The Level 1 Inspection will focus on any evidence of clogging as observed from the surface.

Figure 2.12.2. Examples of underground filters: Left –Perimeter sand filter in a concrete box (photo shows the filter with the grate top off as the filter is being maintained). The right-hand side is a sedimentation chamber filled with water and the left-hand side is the sand filter chamber. Right –Underground vault filter with special organic filter media inside cartridges.

### Sand and Organic Filter Level 1 Inspection

The Level 1 Inspection for Sand and Organic Filters focuses on the Drainage Area (SF1), Inlets (SF2), and Filter Area (SF3). The purpose of a filter practice is to temporarily store collected runoff and have it percolate through a filter media, such as sand, that filters pollutants before the water continues downstream. Most filters have an underdrain system (perforated pipe in a gravel layer) to let the water out of the filter once the filtration takes place. The Level 1 Inspection should be conducted at least annually, especially in early spring, to ensure that the practice has survived the winter, particularly if there has been a significant amount of snow.

#### SF 1. Drainage Area

Description: The drainage area conveys runoff to and is uphill from the filter.

Instruction: Look for both pervious and impervious areas that are uphill from the filter. Consult **Table 2.12.1** below.

**Table 2.12.1 SF Drainage Area**

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
|  ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to get vegetation established.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
|  ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## SF 2. Inlets

**Figure 2.12.3.** Key Areas for Level 1 Inspection of Sand and Organic Filters

Description: The inlets to a filter are where water flows into the filter. Depending on the design, inlets can be:

- Curb cuts or inlets in a parking lot or roadway
- Downspouts that deliver runoff directly from a rooftop to the filter
- Pipes or ditches that carry water into the filter from the drainage area
- Flow directly over the land surface (known as “sheetflow”)

Above-ground filters can have any of the above. Underground filters most likely have curb inlets or flow directly into a grate that is part of the filter itself (see left-hand side of perimeter sand filter shown in **Figure 2.12.3**).

Instruction: Look for all the places where water flows into the filter practice. Consult **Table 2.12.2** below for possible problems.

**Table 2.12.2 SF Inlets**

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Inlets are collecting grit and debris or grass/weeds growing. Some water may not be getting into the filter practice. | ☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that accumulates at these spots.<br>☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in.<br>☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets.<br>☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Filter practice.<br>☐ Dispose of all material properly in an area where it will not re-enter the practice.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the filter practice. |
|  | ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion are present, or there is dirt washing into the filter practice. | ☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<br>☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets and it looks like there is too much water concentrating at these points. The inlet design may have to be modified. |

| Table 2.12.2 SF Inlets | | |
|---|---|---|
| **Problem (Check if Present)** | | **Follow-Up Actions** |
|  | ☐ For an underground filter, water is ponding and doesn't seem to be getting through the filter. | ☐ Kick-Out to Level 2 Inspection: This is generally a more serious problem and should be referred for a Level 2 Inspection because it will require opening up the filter vault to check for clogging. |

## SF 3. Filter Area (for Surface Sand Filters)

Description: The Filter Area is the area that collects water and allows it to seep into the filter media. Some filters also have a vertical perforated pipe that is the cleanout for the underdrain pipe.

Instruction: Examine the surface of the filter and the observation well, if present. Consult **Table 2.12.3** below for possible problems.

| Table 2.12.3 SF Filter Area (for Surface Sand Filters) | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ Filter has grass and vegetation growing on more than 25% of the filter bed, threatening to clog the filter. | ☐ Vegetation growing in the filter bed should be removed either manually or with a water-safe herbicide (e.g., glysophate without surfactants).<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: The filter seems clogged, or vegetation and weeds have proliferated past the point where the Level 1 person can manage it. |
| ☐ Minor amounts of sediment, grit, trash, or other debris are accumulating on the surface. | ☐ Use a shovel to scoop out minor amounts of sediment or grit, especially in the spring after winter sanding materials wash in and accumulate. Dispose of the material where it cannot re-enter the filter.<br>☐ If removing the material creates a hole or low area, rake the surface smooth and level.<br>☐ Remove trash, debris, and other undesirable materials.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sediment (other than sand) has accumulated more than 2-inches deep and covers 25% or more of the surface of the filter area. |

| Table 2.12.3 SF Filter Area (for Surface Sand Filters) | |
|---|---|
| **Problem (Check if Present)** | **Follow-Up Actions** |
| <br>☐ There is erosion on the surface; water seems to be carving out rills as it flows across the filter surface, or sinkholes are forming in certain areas. | ☐ For minor areas of erosion, try filling the eroded areas with clean, coarse construction sand.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the filter area.<br>☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water but by a collapse or sinking of the surface (e.g., “sinkhole”) due to some underground problem. |
| <br>☐ Water is still visible on the surface and/or the standpipe (if present) more than 72 hours after a rainstorm. The filter practice drains very slowly or is completely clogged. | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

# Section 3. Level 2 and 3 Inspections

## 3.1. How to Use this Section

This section provides guidance for Level 2 and 3 inspections for 10 groups of stormwater management practices (SMPs). See Section 1 of this chapter for an explanation of the Maintenance Hierarchy approach.

- Section 3.2 provides general guidance for Level 2 and 3 inspections.
- Sections 3.3 through 3.12 provide detailed Level 2 and 3 inspection guidance for each of the 10 practice categories:
    - o 3.3 Rainwater Harvesting
    - o 3.4 Disconnection and Sheetflow
    - o 3.5 Swales
    - o 3.6 Tree Planting
    - o 3.7 Bioretention
    - o 3.8 Green Roofs
    - o 3.9 Permeable Pavement
    - o 3.10 Ponds and Wetlands
    - o 3.11 Infiltration
    - o 3.12 Sand and Organic Filters
- Each section has **tables** containing guidance for Level 2 inspectors on specific SMP conditions and possible repairs for those problems (in left column), as well as lists of conditions that would likely trigger a Level 3 evaluation or maintenance action (right column). In addition, **Appendix B** contains detailed checklists for Level 2 inspectors to use in the field during their inspections.
- **Section 3.13** provides a brief overview for Level 3 inspections and how these fit into the overall hierarchy. However, most of the content for Level 3 maintenance actions is contained in **Section 4.**

## 3.2. General Guidance for Level 2 and 3 Inspections

The Level 2 inspection will typically be performed by a municipal employee or landscape contractor with some training in stormwater operations and maintenance. Regardless of which type of practice is being inspected, some key procedures and equipment are necessary. Read through this guidance before going on an inspection, and use the specific guidance in **Sections 3.3 through 3.12** for the practice you are inspecting. While much of the equipment and general procedures are somewhat similar to Level 1 inspections, additional information is provided for Level 2 inspectors below.

### When to Conduct a Level 2 Inspection

The Level 2 Inspection is needed for two reasons. First, routine inspections to comply with local stormwater regulations typically require a Level 2 inspector. In addition, a Level 2 inspection may be triggered to address or diagnose problems identified during a Level 1 inspection. In this situation, the Level 2 inspector should confer with the Level 1 inspector about problems they have identified and then conduct a follow-up inspection that focuses more on diagnosing the causes of the problems and possible solutions. The checklists in **Appendix B** and other resources cited in **Sections 3.3 through 3.12** can be used as tools.

The frequency of this type of inspection may be defined by the municipality. As with Level 1 inspections, the frequency may change with the age of the SMP, with higher frequencies the first couple of years after installation. Well-established and well-maintained practices may only need to be inspected every few years.

### Notifying the Responsible Party

Consult the plan file and maintenance agreement to ascertain the responsible party. Confirm that there is right of access through the local code, signed maintenance agreement, or other means. Contact the responsible party at least three business days in advance of the proposed inspection. If the responsible party cannot be found or contacted, make a reasonable effort through file research to contact a property representative, and document these efforts in writing. If the inspection is in response to a Level 1 inspection and referral to your agency, try to speak with the person who conducted the Level 1 inspection and get any documentation they may have. For publicly owned and managed SMPs, the responsible party will likely be the municipality or other regulated MS4.

### What to Take in the Field

Level 2 inspections may require more measurement and, as a result, need some additional materials. In addition, the Level 2 inspection may involve gaining access to private property. Consequently, additional identification is needed for these inspections. A list of recommended items to take in the field is provided in **Table 2.2.1**.

**Table 3.2.1 What to Take in the Field for a Level 2 Inspection**

- Safety equipment: safety vest, steel-toe shoes, traffic cones if working near traffic, etc.
- Approved plan and as-built (record drawing) if available
- Records of previous inspections if available
- Engineering scale
- Hand level and pocket rod if needed to measure relative elevations
- Digital camera
- Several copies of SMP checklist if paper forms are used (**Appendix B**)
- Clipboard and pencils if paper forms are used
- Dry erase white board and marker (optional) to include in photos to keep track of SMP tracking # in municipal database (see **Figure 3.2** as example)
- Letter on municipal letterhead granting access and/or agency photo badge
- Pipe wrench to open underdrain clean-out caps
- Flashlight to look into underdrain cleanouts and/or manholes
- Manhole puller
- Soil probe or auger
- 100' measuring tape
- Shovel
- Bug spray

### Conducting the Inspection

In general, the inspection should follow a consistent, logical approach, such as outlined below.

- Conduct a quick tour of the practice to identify any obvious issues and important components: inlets (number, location), surface area, overflow structures, berms or impoundments, outfalls, downstream conveyance channels or receiving waters. Check these components against the design plan or as-built drawing (if available).
- Starting at the outlet or low point, use the checklists provided in Appendix B to evaluate the practice. The inspection will proceed from the outlet or outfall to the stormwater treatment area, berms, side slopes, inlets, and drainage area. Make sure to fill in key information on the inspection form, such as SMP identifier number, site name, inspector name, date, and weather conditions.


Figure 3.2. A white board and digital camera can be handy to note SMP tracking #, date of inspection, and other forms of documentation. Note that an inspector may alternatively tag photographs, particularly if they are recorded on a smartphone or Tablet.

- Take photos of important components or maintenance concerns, and mark photo locations and direction on a sketch.
- Review the inspection form before leaving the site to make sure that all necessary information has been collected.

### Follow-Up Actions

Immediate follow-up actions include entering the inspection information in the appropriate database or hard copy file, downloading and labeling photos, and providing other necessary documentation.

Another possible follow-up action would be to activate a Level 3 inspection in certain situations. The Level 2 inspector will have to make a judgement call as to whether observed problems warrant a Level 3 investigation, and will also have to coordinate with the responsible party to pursue such an investigation. The Level 2 guidance in this chapter summarizes follow-up actions associated with various observations of SMP condition. Note that these tables are divided into "Level 2" and "Triggers for Level 3" follow-up actions, with Level 2 actions in *blue* cells and Level 3 in *green* cells. Consult **Section 4** of this chapter for more guidance on how to diagnose and correct some of the maintenance items included in these tables.

Another follow-up action involves communicating problems and corrective measures to the responsible party (private or public). This may involve instructing the responsible party to undertake a Level 3 inspection or to provide a timeframe for correcting simpler issues that do not require Level 3 involvement. Many local programs have existing procedures for sending letters or activating a compliance procedure. These procedures include verifying that repairs and corrections are completed by the responsible party.

## Level 3 Inspection Guidance

The Level 3 inspection is typically conducted by a Qualified Professional such as a professional engineer or Landscape Architect. It is assumed that the Level 3 inspector is knowledgeable in stormwater management, as well as engineering and construction practices. The Level 3 inspector will not typically be completing a full practice inspection. This inspection is conducted only in response to problems identified during the Level 2 inspection, is more diagnostic in nature, assumes a greater degree of initial knowledge, and may require more extensive intervention.

The Level 3 inspection is also more results based in that it will lead to a specific repair to address the issue that triggered the inspection. **Section 4** identifies 12 problems typically addressed in a Level 3 inspection and discusses measures to diagnose the cause of the problem, as well as repairs needed to address it. It should be noted that the problems addressed in each **Section 4** subsection can occur in a variety of SMPs (e.g., erosion is a common issue in almost every type of SMP). As a result, each subsection identifies the SMPs where the problem most commonly occurs and, in some cases, an SMP-specific diagnosis procedure.

## 3.3. Rainwater Harvesting – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Rainwater Harvesting practices are:

- Structural or mechanical problems (e.g., malfunction of the first-flush diverter or vortex filter)
- Accumulation of debris in the tank that cannot be easily removed by hand
- Severe erosion at the outlet

**Table 3.3.1 Level 2 Inspection – RAINWATER HARVESTING**

| Recommended Repairs | Triggers for Level 3 Inspection |
|---|---|
| ***Observed Condition: Tank is not filling properly or water level drops quickly*** | |
| Condition 1: Tank is not filling properly<br><br>Look for signs of water bypassing the tank. Inspect the conveyance system and filters to make sure that all parts are properly connected and not leaking. Observe the system during a rainstorm to make sure that water is not backing up and spilling out of the gutters or getting excessively diverted by the filter. Adjust angles and placement of filter as needed.<br><br>Condition 2: Water level drops quickly after filling<br><br>Requires diagnosis and resolution of problem:<br>• Leaking valve or spigot?<br>• Crack in tank wall?<br>• Pump turning on unnecessarily? | • Gutters, pipes, and/or filter appear to be undersized or not properly designed.<br>• Structural or mechanical problem requires special expertise in rainwater harvesting systems. |
| ***Observed Condition: Tank is sinking, leaning, or at risk of collapse*** | |
| Condition 1: Foundation is not stable<br><br>This repair may need specialized equipment and skill, depending on the size and type of tank. For smaller tanks (like rain barrels), drain and disconnect the tank to move it aside. Compact the underlying soil and create a solid, level base for the tank with concrete blocks or gravel. Seek professional help for larger tanks.<br><br>Condition 2: Other structural problem<br><br>Seek professional help. | • Tanks cannot be easily adjusted or fixed by hand. |
| ***Observed Condition: Severe erosion at outlet*** | |
| Condition 1: Erosion gets worse even after re-seeding or adding stone<br><br>There are several potential solutions to this continued erosion. Add geotextile fabric below the stone to protect the soil. Dig out a pit at the outfall and fill with gravel or stone to absorb the velocity of the water spilling out the tank. If the outlet flows onto a steep slope, consider extending the pipe length to a flatter area. Some of these actions may require help from a contractor. | • Erosion control cannot easily be installed by hand.<br>• Erosion recurs after previous repairs.<br>• Downstream drainage concerns |

## 3.4. Disconnection & Sheet Flow – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Disconnection and Sheetflow practices are:

- Significant damage to level spreader/energy dissipator
- Major erosion

**Table 3.4.1 Level 2 Inspection – DISCONNECTION AND SHEETFLOW**

| Recommended Repairs | Triggers for Level 3 Inspection |
|---|---|
| ***Observed Condition: Significant sediment on pavement that drains to disconnection area (e.g., grass strip)*** | |
| Condition 1: Sediment on parking lot is widespread<br><br>Enlist a mechanical sweeper or vacuum sweeper to remove sediment across entire pavement surface. Pay special attention to downhill edges of pavement where more sediment may have accumulated. | • Sediment accumulation is so serious that it cannot be sufficiently removed with mechanical sweeper. May indicate a high sediment load from uphill in the drainage area that needs to be mitigated. |
| ***Observed Condition: Pavement edge deteriorating*** | |
| Condition 1: Dips or damage at pavement edge causing runoff to concentrate<br><br>Determine whether the damaged edge is causing significant enough concentration of runoff to warrant repair or regrading of the pavement. | • Edge must be patched or re-paved to make secure and level.<br>• Parking lot not draining properly to the energy dissipator and treatment area. |
| ***Observed Condition: Level spreader/energy dissipator*** | |
| Condition 1: Level spreader sinking or uneven<br><br>If basic equipment can be used, prop up and secure any section of level spreader that is sinking. Regrade soil all around level spreader and add stone as necessary to prevent erosion and bypassing.<br><br>Condition 2: Level spreader is broken<br>These repairs can be simple for small, residential-scale practices, such as at a downspout. Ensure the level spreader is level across, keyed in to soil at the edges, and made of durable material that can withstand the flow of water running across it.<br><br>Larger or more complicated level spreaders (e.g., concrete) will likely require specialized skill and equipment. | • Level spreader requires specialized equipment, regrading, or large amount of material to make level again.<br>• Level spreader needs to be re-designed and replaced. |
| ***Observed Condition: Erosion in treatment area*** | |
| Condition 1: Rills from concentrated flow<br><br>Inspect energy dissipator to see whether it needs to be improved to better spread out incoming flow. Regrade flow path to ensure that it is relatively flat (if minor). If major re-grading is needed, the treatment area may need to be redesigned and fixed with specialized equipment. | • Major rills and gullies<br>• Treatment area needs to be re-designed and major grading needed. |

## 3.5. Swales – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Swales are:

- Standing water, swale not draining properly (not applicable to wet swales)
- Severe erosion around or under check dams
- Large area of vegetation overrun with weeds and/or invasive species
- Severe erosion at outlet that requires redesign

**Table 3.5.1 Level 2 Inspection: SWALE**

| Recommended Repairs | Triggers for Level 3 Inspection |
|---|---|
| ***Observed Condition: Water Stands on Surface for More than 72 Hours after Storm*** | |
| Condition 1: Small pockets of standing water<br><br>Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have compacted soil, try scraping off top 3 to 6 inches of soil and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas.<br><br>Condition 2: Standing water is widespread or covers entire surface<br><br>Requires diagnosis and resolution of problem:<br>Bad or compacted soil<br>Filter fabric on the swale bottom<br>Too much sediment/grit washing in from drainage area?<br>Too much ponding depth?<br>Longitudinal slope is too flat? | • Soil is overly compacted or clogged and problem is not evident from Level 2 inspection.<br>• Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice (e.g., not enough slope down through the swale). |
| ***Observed Condition: Vegetation is predominantly weeds and invasive species*** | |
| For a small area, weed and dig up invasive plants. Replant with natives or plants from original planting plan.<br><br>If longer than 100 feet, develop a new planting plan and have it professionally reviewed. | • Vegetation deviates significantly from original planting plan; swale has been neglected and suffered from deferred maintenance.<br>• Owner/responsible party does not know how to maintain the practice.<br>• For large area, hire a professional to develop a grading plan and develop a planting plan. |

| Observed Condition: Severe erosion of check dams, inlets, swale bottom, or side slopes | |
|---|---|
| | • Erosion (rills, gullies) is more than 12-inches deep at inlets or the swale bottom or more than 3-inches deep on side slopes.<br>• Flow paths from the drainage area are higher than expected, such that the swale needs to be redesigned to handle higher flow rates and velocities. |

| Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment | |
|---|---|
| Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of swale soil media; replace with clean material. Check drainage area for any ongoing sources of sediment.<br><br>Condition 2: Majority of the surface is caked with “hard pan” (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more<br><br>This can be caused by improper construction sequence (drainage area not fully stabilized prior to installation of the swale) or another chronic source of sediment in the drainage area. Augering several holes down along the swale can indicate how severe the problem is; often the damage is confined to the first several inches of soil. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long the problem does not recur. | • More than 2 inches of accumulated sediment cover 25% or more of the swale surface area.<br>• “Hard pan” of thin, crusty layer covers majority of swale surface area and seems to be impeding flow of water along the swale.<br>• New sources of sediment seem to be accumulating with each significant rainfall event. |

## 3.6. Tree Planting – Level 2 Inspections and Triggers for Level 3

A Level 2 Tree Planting inspection should be conducted periodically during the growing season by the Cooperative Extension or an arborist.

| **Table 3.6.1 Level 2 Inspection: TREE PLANTING** | |
|---|---|
| **Recommended Repairs** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Appearance of fungus or pest damage*** | |
| Condition 1: Fungus, discoloration, browning leaves or holes in leaves<br><br>Check with arborist or other tree professional about the best way to proceed. This requires a Level 3 inspection.<br><br>Condition 2: Burrowing insects, holes<br><br>Check with arborist or other tree professional about the best way to proceed. This requires a Level 3 inspection. | • Any concerns about how to address infestation or disease |

## 3.7. Bioretention – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Bioretention are:

- Standing water, clogged media
- Vegetation management
- Bioretention does not conform to original design plan in surface area or storage.
- Severe erosion of filter bed, inlets, or around outlets
- Significant sediment accumulation, indicating an uncontrolled source of sediment

| **Table 3.7.1 Level 2 Inspection: BIORETENTION**<br>**NOTE: Key Source for this Information *(CSN, 2013)*** | |
|---|---|
| **Recommended Repairs** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Water Stands on Surface for More than 72 Hours after Storm*** | |
| Condition 1: Small pockets of standing water<br><br>Use a soil probe or auger to examine the soil profile. If isolated areas have accumulated grit, fines, or vegetative debris or have bad soil media, try scraping off top 3 inches of media and replacing with clean material. Also check to see that surface is level and water is not ponding selectively in certain areas.<br><br>Condition 2: Standing water is widespread or covers entire surface<br><br>Requires diagnosis and resolution of problem:<br>• Clogged underdrain?<br>• Filter fabric between soil media and underdrain stone?<br>• Need to install underdrain if not present?<br>• Too much sediment/grit washing in from drainage area?<br>• Too much ponding depth?<br>• Improper soil media? | • Soil media is clogged and problem is not evident from Level 2 inspection.<br>• Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice. |

| | |
|---|---|
| ***Observed Condition: Vegetation is sparse or out of control*** | |
| Condition 1: Original design planting plan seems good but has not been maintained, so there are many invasives and/or dead plants<br><br>Will require some horticultural experience to restore vegetation to intended condition by weeding, pruning, removing plants, and adding new plants.<br><br>Condition 2: Original design planting plan is unknown or cannot be actualized<br><br>A landscape architect or horticulturalist will be needed to redo the planting plan. Will likely require analysis of soil pH, moisture, organic content, sun/shade, and other conditions to make sure plants match conditions. Plan should include invasive plant management and maintenance plan to include mulching, watering, disease intervention, periodic thinning/pruning, etc. | • Vegetation deviates significantly from original planting plan; Bioretention has been neglected and suffered from deferred maintenance.<br>• Owner/responsible party does not know how to maintain the practice. |
| ***Observed Condition: Bioretention does not conform to original design plan in surface area or storage*** | |
| Condition 1: Level 2 Inspection reveals that practice is too small based on design dimension, does not have adequate storage (e.g., ponding depth) based on the plan, and/or does not treat the drainage area runoff as indicated on the plan<br><br>Small areas of deviation can be corrected by the property owner or responsible party, but it is likely that a Qualified Professional will have to revisit the design and attempt a redesign that meets original objectives or that can be resubmitted to the municipality for approval. | • More than a 25% departure from the approved plan in surface area, storage, or drainage area; sometimes less than this threshold at the discretion of the Level 2 inspector. |
| ***Observed Condition: Severe erosion of filter bed, inlets, or around outlets*** | |
| Condition 1: Erosion at inlets<br><br>The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a more non-erosive lining and/or to extend the lining further down to where inlet slopes meet the Bioretention surface. If problem persists, analysis by a Qualified Professional is warranted.<br><br>Condition 2: Erosion of Bioretention filter bed<br><br>This is often caused by “preferential flow paths” through and along the Bioretention surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads).<br><br>Condition 3: Erosion on side slopes<br><br>Again, the issue is likely linked with unanticipated flow paths down the side slopes (probably overland flow that concentrates as it hits the edge of the slope). For small or isolated areas, try filling, compacting, and re-establishing healthy ground cover vegetation. If the problem is more widespread, further analysis is required to determine how to redirect the flow. | • Erosion (rills, gullies) is more than 12 inches deep at inlets or the filter bed or more than 3 inches deep on side slopes.<br>• If the issue is not caused by moving water but some sort of subsurface defect. This may manifest as a sinkhole or linear depression and be associated with problems with the underdrain stone or pipe or underlying soil. |
| ***Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment*** | |
| Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep<br><br>Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of Bioretention soil media; replace with clean material. Check drainage area for any ongoing sources of sediment.<br><br>Condition 2: Majority of the surface is caked with “hard pan” (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more<br><br>This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of Bioretention soil media) or another chronic source of sediment in the drainage area. Augering several holes down through the media can indicate how severe the problem is; often the damage is confined to the first several inches of soil media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long as the problem does not recur. | • More than 2 inches of accumulated sediment cover 25% or more of the Bioretention surface area.<br>• “Hard pan” of thin, crusty layer covers majority of Bioretention surface area and seems to be impeding flow of water down through the soil media.<br>• New sources of sediment seem to be accumulating with each significant rainfall event. |

## 3.8. Green Roof – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Green Roofs are:

- Standing water
- Vegetation management
- Structural damage

| Table 3.8.1 Level 2 Inspection: GREEN ROOF | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Unhealthy or Dying Vegetation*** | |
| | • More than 25% die off<br>• Plants are unhealthy for a prolonged period of time or need to be replanted repeatedly, indicating that a new planting plan may be necessary, or the planting medium is not functioning properly.<br>• pH or other media constituents are not conducive to plant growth, and the media needs to be amended (e.g., lime, fertilizer). This should be handled by a green roof vendor or green roof plant specialist. |
| ***Observed Condition: Ponding Between Storm Events or Debris Accumulation*** | |
| Condition 1: Further inspection shows debris is clogging the outflow drainpipe<br><br>Remove debris by hand and revisit within 24 hours to see whether this action fixed the problem.<br><br>Condition 2: Debris has backed up to include the underdrain<br><br>Attempt to remove by hand or flush out with a hose. | • Ponding continues even after debris has been removed. This may indicate a problem with either the media or the underdrain system. |
| ***Observed Condition: Structural Damage to Overflows*** | |
| Condition: If the damage is minor, repair damage directly, per original design drawings | • Most instances of structural damage will need to be referred to the designer or a qualified green roof vendor. |
| ***Observed Condition: Roof is Leaking or indication that the membrane has a leak*** | |
| Condition: Roof is leaking | • Any leaks in the membrane trigger a Level 3 inspection or an inspection by the original installer or designer. |

## 3.9. Permeable Pavement – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Permeable Pavement are:

- Ponding or
- Highly clogged pavement

| Table 3.9.1 Level 2 Inspection: PERMEABLE PAVEMENT | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Bare Soil or Erosion in the Drainage Area*** | |
| | • Large rills or gullies are forming in the drainage area.<br>• An attempt to regrade the drainage area has been unsuccessful<br>• Fixing the problem would require major regrading (i.e., redirecting more than a 100-square-foot area.<br>• It is not clear why the problem is occurring. |
| ***Observed Condition: Dirt or Grit Accumulating, or Grass Growing on Pavement Surface*** | |
| Condition 1: Grit beginning to form but is isolated to a small area or does not fill the joints between paver blocks<br><br>Try to agitate and sweep by hand, or hire a contractor with a vacuum sweeper. Also investigate the drainage area for potential sediment sources. If no obvious sources are found, discuss winter sanding and salting operations with the property owner to identify whether this could be the source.<br><br>Condition 2: Grit is forming and cannot be removed with agitation and hand sweeping<br><br>Hire a vendor with a regenerative air vacuum sweeper, maximum power 2,500 rpm; avoid sweepers that use water. | • More than 2 inches of sand/dirt/grit are on some of the pavement surface.<br>• More than 25% of the pavement surface is covered with sand/dirt/grit to the extent that joints between paver blocks are filled.<br>• Regenerative air sweeper cannot remove grit. |
| ***Observed Condition: Structural Damage*** | |
| Condition 1: Portions of porous asphalt or permeable pavers are damaged, and the cause is known to be at the surface.<br><br>If the damage is from a single event such as heavy equipment or heavy fallen objects, or the surface has been damaged by wear over time, hire a contractor experienced in permeable pavement installation to repair the damaged areas.<br><br>Condition 2: Damage to other structures, such as drainage infrastructure<br><br>If possible, repair or replace damaged items, or hire a contractor with permeable pavement experience if the damaged infrastructure is within the pavement surface. | • More than 25% of the surface needs to be repaired or replaced.<br>• It appears that the underlying material has “caved in,” indicating an underlying water conveyance or soil stabilization issue.<br>• Problem is repaired but recurs within less than five years. |

| Table 3.9.1 Level 2 Inspection: PERMEABLE PAVEMENT | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Ponding on the Pavement Surface*** | |
| Condition 1: Underdrains (if present) may be clogged<br><br>Check to see whether underdrains are clogged by inspecting cleanouts (if present) or catch basins and looking for debris. If underdrains appear clogged, it may be necessary to hire a router service to ream out the underdrains.<br><br>Condition 2: At time of Level 2 inspection, water is not ponded, and there is no obvious clogging of the surface.<br><br>Conduct a flood test to determine whether the ponding is an ongoing problem. | • Water stands on the pavement surface more than 72 hours after a storm, and the problem cannot be resolved by unclogging underdrains.<br>• More than 25% of the pavement surface is covered with sand/dirt/grit to the extent that joints between paver blocks are filled. |

Figure 3.9.1. Winter salting, sanding, plowing, and snow storage can cause problems for permeable pavement surfaces, which will trigger a Level 3 investigation.

Figure 3.9.2. A Level 3 investigation is warranted if more than 25% of the permeable pavement surface appears to be clogged, or joints are filled in, or, as shown in the photo, vegetation is growing.

## 3.10. Ponds & Wetlands – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Ponds and Wetlands are:

- Severe erosion
- Excessive algae or aquatic plants
- Settlement and pipe corrosion
- Major sediment buildup

| Table 3.10.1 Level Inspection: PONDS and WETLANDS | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Bare Soil or Erosion in the Drainage Area*** | |
| Condition 1: Extensive problem spots, but no channels or rills forming<br><br>Reseed problem areas. If problem persists or grass does not take, consider hiring a landscape contractor.<br><br>Condition 2: Problem is extensive, and rills/channels are beginning to form<br><br>May be necessary to divert or redirect water that is causing the erosion problem. If it appears that simple regrading—such as installing a berm or leveling a low spot–will fix the problem, make repairs and ensure that the problem is repaired after the next storm. | • Large rills or gullies are forming in the drainage area.<br>• An attempt to regrade the drainage area has been unsuccessful.<br>• Fixing the problem would require major regrading (i.e., redirecting more than a 100-square-foot area.<br>• It is not clear why the problem is occurring. |
| ***Observed Condition: Manholes or Inlet Pipe Buried or Covered with Vegetation*** | |
| Condition 1: Nearest manhole and inlet pipe not found<br><br>Consult as-built drawings to get to closest suspected location and use metal detector to search for metal manhole cover. If unsuccessful, identify nearest drain inlets and approximate pipe direction to locate next manhole.<br><br>Condition 2: Manhole located and inspected<br><br>Never enter a manhole, except by following confined-space entry protocols.<br><br>If outlet pipe is not visible or greater than 25% full of sediment/debris or trash, it will typically require a qualified contractor to flush, clean and clear blockages.<br><br>Condition 3: Inlet pipe not found at pond<br><br>Clear vegetation and brush that may be covering the inlet pipe. Buried inlet pipes may be found through use of a metal probe.<br><br>Condition 4: Inlet pipe buried in sediment or blocked by vegetation<br><br>Once located, the pipe path can be cleared of vegetation with brush hook or other brush tools. Light digging may clear sediment from the end of the pipe. | • To locate buried manholes and lost storm lines, it is sometimes necessary to hire a pipeline inspection contractor with televising equipment or ground-penetrating radar and enter at the closest upstream access point.<br>• Locating a buried inlet pipe may require wading in the edge of the pond and using a metal probe and brush axe to find and expose the pipe.<br>• If other than light digging is necessary to remove accumulated sediment, a contractor with heavy equipment may be required. |

| Table 3.10.1 Level Inspection: PONDS and WETLANDS | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Pipe or Headwall Settlement, Erosion, Corrosion or Failure*** | |
| Condition 1: Pipe or headwall settlement or failure<br><br>Severe sinkholes, settlement or corrosion should be kicked out to Level 3 Inspection.<br><br>Condition 2: Flow not confined to pipe and visible outside pipe wall<br><br>With flashlight, observe the inside of the pipe and note its condition. Take photographs. Look for sinkholes developing that indicate pipe failure beneath the surface. Kick out to Level 3 inspection. | • Where blockages are visible, a decision is needed on whether to clear them or leave in place. If a third of the pipe is full of sediment, it should be removed by a contractor with pipe-cleaning equipment.<br>• Corrosion of inlet pipes that allows flow around the pipe exterior is a structural concern because it can lead to settlement, sinkholes and undermining pond embankment. Evidence of this type of failure may require specialized pipe-inspection equipment and investigation by an engineer. |
| ***Observed Condition: Pond Conditions*** | |
| Condition 1: Pond pre-treatment zone is full of sediment or not constructed as shown on as-built drawings.<br><br>Condition 2: Excessive buildup of sediment or overgrowth<br><br>If the pre-treatment area or pond pool is overgrown or filled with sediment so that the original design is compromised, corrective measures are required. If plants have died, then replanting is necessary. If none of the original design exists due to alteration or sediment, kick out to Level 3 inspection. | • It may require inspection by an engineer to determine next steps for clearing, replanting or reconstruction.<br>• Erosion or settlement such that design has been compromised should be reviewed by an engineer. Recurring erosion may require redesign and/or regrading to direct flow away from eroding area.<br>• If sediment has filled more than 50% of the pond's capacity, dredging is likely needed and should be evaluated by a qualified contractor.<br>• Removal or control of excessive algae or aquatic plants can be assessed by a qualified pond maintenance company. |

## 3.11. Infiltration – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Infiltration practices are:

- Standing water, clogged media
- Severe erosion of infiltration area, inlets, or around outlets
- Significant sediment accumulation, indicating an uncontrolled source of sediment

| Table 3.11.1 Level Inspection: INFILTRATION | |
|---|---|
| **Recommended Repairs** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Water Stands on Surface for More than 72 Hours after Storm*** | |
| Condition 1: Small pockets of standing water<br><br>For infiltration basins with soil, use a soil probe or auger to examine the soil profile. For gravel infiltration trenches or basins, use a shovel to dig into the gravel layer where the problem is occurring. If isolated areas have accumulated grit, fine silt, or vegetative debris or have bad soil or clogged gravel, try removing and replacing with clean material. If the practice is supposed to have grass cover, it will likely be necessary to replant once the problem is resolved.<br><br>Condition 2: Standing water is widespread or covers entire surface<br><br>Look in the observation well (if it exists) and use a tape measure to estimate the depth of water standing in the soil or gravel. Requires diagnosis and resolution of problem:<br>• Too much sediment/grit washing in from drainage area?<br>• Too much ponding depth?<br>• Improper infiltration media?<br>• Underlying soil not suitable for infiltration?<br>As above, the resolution will likely require replanting and re-establishment of good grass cover if this is part of the design. | • Infiltration media is clogged and problem cannot be diagnosed from Level 2 inspection.<br>• Level 2 inspection identifies problem, but it cannot be resolved easily or it is associated with the original design of the practice. |
| ***Observed Condition: Severe erosion of infiltration bed, inlets, or around outlets*** | |
| Condition 1: Erosion at inlets<br><br>The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a less erosive lining and/or extending the lining further down to where inlet slopes meet the infiltration surface. If problem persists, analysis by a Qualified Professional is warranted.<br><br>Condition 2: Erosion of infiltration bed<br><br>This is often caused by “preferential flow paths” along the surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads). | • Erosion (rills, gullies) is more than 12 inches deep<br>• The issue is not caused by moving water but some sort of subsurface defect, which may manifest as a sinkhole or linear depression and be associated with problems with the underlying stone or soil. |

| | |
|---|---|
| ***Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment*** | |
| Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep<br>Sediment source may be from a one-time or isolated event. For practices with soil cover, remove accumulated sediment and top 2 to 3 inches of soil; replace with clean material. Check drainage area for any ongoing sources of sediment.<br><br>Condition 2: Majority of the surface is caked with "hard pan" (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more<br><br>This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of infiltration practice) or another chronic source of sediment in the drainage area. For infiltration basins with soil, augering several holes down through the media can indicate how severe the problem is; often the damage is confined to the first several inches of soil media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long the problem does not recur. | • Trenches or dry wells with stone or gravel at surface may need to be cleaned out with a vacuum truck because the process of removing the top layer of stone may cause fine silt to drop further down.<br>• More than 2 inches of accumulated sediment cover 25% or more of the infiltration surface area.<br>• "Hard pan" of thin, crusty layer covers majority of Infiltration surface area and seems to be impeding flow of water down through the soil media.<br>• New sources of sediment seem to be accumulating with each significant rainfall event. |

## 3.12. Sand and Organic Filters – Level 2 Inspections and Triggers for Level 3

The most likely triggers for a Level 3 Inspection for Sand and Organic Filters are:

- Standing water, clogged filter media
- Need to pump out sedimentation chamber
- Response to fuel or other spills that make it into the filter

**Table 3.12.1 Level 2 Inspection: SAND AND ORGANIC FILTERS**

| Recommended Repairs | Triggers for Level 3 Inspection |
|---|---|
| ***Observed Condition: Water Stands on Surface for More than 72 Hours after Storm*** | |
| Condition 1: Small pockets of standing water<br><br>Use a soil probe or auger to examine the sand or filter profile. If isolated areas have accumulated grit, fine silt, vegetative debris, oily sludge or bad sand media, try scraping off top 3 inches of media and replacing with clean, coarse construction sand.<br><br>Condition 2: Standing water is widespread or covers entire surface<br><br>Look in the underdrain cleanout (if present) and use a tape measure to estimate the depth of water standing in the sand layer. Requires diagnosis and resolution of problem:<br>• Clogged underdrain<br>• Filter fabric between the sand layer and underdrain gravel OR on top of the sand filter layer (usually held in place by a thin layer of gravel)<br>• Too much sediment/grit/vegetative debris/oily sludge washing in from drainage area<br>• Too much ponding depth<br>• Improper sand media | • Sand or organic media is clogged, but problem was not evident from Level 2 inspection.<br>• Level 2 inspection identifies problem, but it cannot be resolved easily or is associated with the original design of the practice.<br>• The problem seems to be filter fabric placement, but this is specified in the original design.<br>• The entire filter media layer or filter cartridges need to be replaced.<br>• The problem is associated with improper configuration of underdrain pipes or outlet structures. |

| Observed Condition: Severe erosion of filter bed, inlets, or around outlets | |
|---|---|
| | • Erosion (rills, gullies) is more than 12 inches deep.<br>• The issue is not caused by moving water but some sort of subsurface defect, which may manifest as a sinkhole or linear depression and be associated with problems with the underlying stone or soil. |

| Observed Condition: Significant sediment accumulation, indicating an uncontrolled source of sediment | |
|---|---|
| Condition 1: Isolated areas of sediment accumulation, generally less than 3-inches deep<br>Sediment source may be from a one-time or isolated event. Remove accumulated sediment and top 2 to 3 inches of sand or filter media; replace with clean material. Check drainage area for any ongoing sources of sediment.<br><br>Condition 2: Majority of the surface is caked with “hard pan” (thin layer of clogging material) or accumulated sediment that is 3-inches deep or more<br><br>This can be caused by an improper construction sequence (drainage area not fully stabilized prior to installation of filter practice) or another chronic source of sediment in the drainage area. Augering several holes down through the sand media can indicate how severe the problem is; often the damage is confined to the first several inches of media. Removing and replacing this top layer (or to the depth where sediment incursion is seen in auger holes) can be adequate, as long the problem does not recur. | • More than 2 inches of accumulated sediment cover 25% or more of the filter surface area.<br>• “Hard pan” of thin, crusty layer covers majority of filter surface area that seems to be impeding flow of water down through the filter media.<br>• New sources of sediment seem to be accumulating with each significant rainfall event. |

| Observed Condition: Underground vault system has standing water and oily sludge floating on top, or other issues that indicate clogging, malfunction, or need for maintenance | |
|---|---|
| Condition: Compare observation to the design or as-built plans to see whether existing conditions match the plan details. | • This condition will almost always warrant conferring with the manufacturer or vendor and/or using the Level 3 inspection process to further diagnose the problem. |

# Section 4. Diagnostics and Maintenance Measures

## 4.1. About this Section

Section 4 summarizes the most common problems found in SMPs, as well as typical maintenance or repair solutions. The guidance provided in this section has some similarities to **Section 3** but differs in the following ways:

1. The primary audience for Section 4 is the Level 3 inspector, often a professional engineer, or landscape architect tasked with diagnosing and repairing SMPs that are not working properly. However, the information in Section 4 may also be quite useful for a Level 2 inspector seeking to diagnose a particular problem.
2. The maintenance measures described in this section are more detailed and focus on repairs to specific problems rather than on routine maintenance such as weeding or minor sediment removal.
3. Because the problems described in this section can be applied to several different practices, this section is organized by the type of problem rather than the practice type.

Problems addressed during Level 3 inspection/maintenance are summarized in **Table 4.1**. This list is not exhaustive but does address the most common issues in the SMPs that require some advanced knowledge and skill to inspect and fix. Each problem category is discussed in a separate sub-section.

**Table 4.1: Common Inspection/Maintenance Issues for Level 3**

| Sub-Section/Category | Description |
|---|---|
| 4.2 Contributing Drainage Area – Pollutant Sources | Sediment or pollution sources in the Drainage Area |
| 4.3 Physical Obstructions | Physical obstructions to maintenance access, overflow, or emergency spillway |
| 4.4 Erosion | Erosion on side slopes, practice bottom, at inlet or outlets. Rills and gullies forming where there should be sheetflow |
| 4.5 Departures from Design Dimensions | Practice dimensions have been altered, either due to filling with sediment, redesign or filling in, or improper implementation. |
| 4.6 Improper Flow Pathways | Flow is shortcircuiting the practice, or drainage pathways have been otherwise modified. |
| 4.7 Sediment Buildup | Sediment has accumulated in a pool, practice bottom, pre-treatment area, or vault. |
| 4.8 Clogging | The soil media or other components are clogged, and there may be standing water for longer than intended. |
| 4.9 Vegetation | Excessive, inadequate, and/or unhealthy vegetation to support a practice |
| 4.10 Embankment and Overflow Condition | Issues with an embankment or overflow weir or channel |
| 4.11 Structural Damage | SMP infrastructure, such as concrete or metal elements, have been damaged. |
| 4.12 Pool Stability | Permanent pool of water is at the improper elevation. |
| 4.13 Pool Quality | Permanent pool of water suffers from poor quality due to algal growth or other issues. |

## 4.2. Contributing Drainage Area – Pollutant Sources

**Issue applies most commonly to**: Sheetflow/Disconnection, Swales, Bioretention, Permeable Pavement, Ponds/Wetlands, Infiltration, and Sand/Organic Filters.

### Problem #1: Bare soil washing into SMP from drainage area

**General Approach for All Practices:**

- Identify the specific source(s) of sediment in the drainage area by tracking sediment flow during a rainfall or looking for a track of sediment staining during dry weather.
- For an active sedimentation event, attempt to filter incoming runoff if conditions allow (e.g., enough space upstream of the practice for temporary ponding). Consider installing a silt fence, silt socks (at curb inlets), staked straw bales, or other filtering material at the inlets of the SMP. This will keep at least some of the sediment from getting into the practice.
- Runoff from active construction should not enter the SMP; divert to a temporary and approved sediment control practice.
- For areas of bare soil *not* due to active construction **(bottom photo)**, prep the soil and re-seed/plant with grass species or other thick ground cover appropriate for the region. May also need starter fertilizer, topsoil, and/or compost.
- For steep slopes with bare soil, consider also installing erosion-control matting to hold soil, seed, and straw in place until the vegetation becomes well established.
- For fill and topsoil stockpiles in the drainage area, provide temporary or permanent cover as soon as possible. Alternatively, surround the base of the stockpile with silt fence, or equivalent, to prevent the transport of sediment-laden runoff.

**Helpful Skills:**

- Erosion and sediment control knowledge and skills
- Landscaping knowledge to understand appropriate ground cover species for re-vegetating bare areas

**Equipment Typically Used for Fixing Sediment Sources:**

- Silt fencing and other sediment barriers
- Erosion-control matting and/or straw
- Rakes and shovels
- Light excavation or grading equipment for larger jobs
- Equipment to deliver topsoil or compost as needed
- Plants and/or seed mix, plus a way to move and store plant stock without damaging it or drying it out
- Starter fertilizer, topsoil, and/or compost

## Problem #2: Other pollution sources in the drainage area

**General Approach for All Practices:**

- Pollutants may include: road salt, oils, fuels, food grease, wash water, paints and solvents, trash, and many others.
- Identify the source(s) of pollution.
- For pollutants spilled on the ground, remove by hand or use absorbents to soak up wet material. Absorbents and other waste materials shall be disposed of properly.
- For materials stored outside, move them to a covered area or build/add cover over the materials. Provide secondary containment, if possible.
- Make sure all waste containers have lids and fix any leaks (**see poor practices in photo at right**).
- For sites prone to frequent oil leaks and staining (e.g., vehicle maintenance yards), consider installing an oil/water separator to pre-treat runoff that enters the SMP.
- For routine dumping of wash water, grease, paints, or other pollutants, enforce behavior change and explain good housekeeping practices.
- Develop a pollution prevention plan for the site to ensure that hazardous materials and other potential pollutants are not stored where they are exposed to rainfall.
- For areas that receive a heavy salt and/or sand load during the winter, consider diverting upslope runoff, especially for practices such as permeable pavement. Some monitoring of winter road or parking lot clearing activities may also be warranted.

**Helpful Skills:**

- Knowledge of good housekeeping and pollution prevention practices
- Good communication with employees and managers at site (e.g., for correcting bad site operations)

**Equipment Typically Used for Correcting Other Pollutant Sources:**

- Tarps to cover stockpiles
- Absorbents to soak up spills
- Secondary containment barriers that will hold back any liquids or solids that may leak out of their primary container
- Storage barns, sheds, pole barns and other permanent cover for potential pollutants

## 4.3. Physical Obstructions

**Issue Applies Most Commonly To**: Rainwater Harvesting, Sheetflow/Disconnection, Swales, Bioretention, Green Roofs, Ponds/Wetlands, Infiltration, and Sand/Organic Filters

**Problem #1: Maintenance access is obstructed**

**Ground-Level SMPs:**

- Where a path for vehicles and construction equipment to access the practice was established during construction but is now overgrown, remove woody vegetation and any other tall vegetation. This path should be bush hogged once or twice a year.
- If the SMP needs a large quantity of trash and/or sediment removed in areas where access is limited due to steep grades, overgrown vegetation, etc., it will be necessary to establish safe vehicular access by clearing and possibly re-grading the area. It is advisable to have a maintained, all-weather surface to critical parts of the SMP.
- It is most important to provide access nearest to parts of the practice where sediment and trash tend to accumulate the most: forebay and riser structure.
- For an SMP blocked by fences **(photo at right)**, install a gate that is wide enough for vehicles to enter for any current or future maintenance.
- Sometimes access is blocked by unauthorized structures, such as sheds, property fences, retaining walls, etc. Confer with the local stormwater authority on the presence of any maintenance easements and means to gain access to the practice.
- The solutions above should also provide for safe foot access for routine inspection and maintenance.

**Rainwater Harvesting:**

- Ensure that no structures are covering the filter or the tank's access/inspection port.

**Green Roofs**

- Ensure that individuals can safely reach the roof with tools in hand (e.g., buckets, pruners, hoses). If the roof cannot be accessed via a walk-through door, this may require installing a wide ladder or fire escape-style stairs on the inside or outside of the building.
- If there is a concern of getting too close to the roof's edge while doing maintenance, install a railing around the edge for safety. Alternatively, for sloped roofs, workers may need to use harnesses during maintenance activities.

**Helpful Skills:**

- Use of motorized landscaping equipment
- Chainsaw skills
- Use of grading equipment for larger jobs
- *Note*: OSHA safety requirements and certifications may apply to green roof maintenance.

**Equipment Typically Used to Regain Proper Access:**

- Mower, trimmer
- For very overgrown areas, chainsaw and/or bush hog
- For areas that need to be regraded, excavator, skid steer, or other grading equipment

## Problem #2: Flow is obstructed in or out of the practice

**General Approach for All Practices:**

- Flow can bypass an SMP when there is too much sediment/debris buildup near the inlets or due to grading changes in the drainage area (e.g., repaving of parking lot). If the cause of blockage or bypass is not obvious, inspect the practice during rainfall to watch the flow paths. (See **Section 4.6 – Improper Flow Pathways** for additional guidance.)
- Obstruction of overflow or emergency spillway structures is most often due to buildup of debris, such as trees, sticks, trash. It is *very* important to keep these structures clear of such blockages in order to avoid flooding or a dam breach (**avoid conditions caused by beaver activity - top photo**).
- Where debris cannot easily be cleared by hand, special equipment and skills may be needed. An obstructed riser structure in a wet pond may need to be accessed by boat **(bottom photo)**. In cases where large sticks, tree branches, trash, or other debris obstruct the overflow or spillway, they may need to be cut up by chainsaw. Large debris will usually need to be hauled away with a truck.

**Helpful Skills:**

- Chainsaw skills
- Muscle strength to haul large debris
- Boating capabilities

**Equipment Typically Used to Clear Obstructions:**

- Gloves, shovels, pruners, rakes, and other hand tools
- Waders for wetlands
- Chainsaw for large sticks and branches
- Cable puller (come-along) to remove large branches that cannot be pulled out by hand
- Boat and personal floatation device for riser structures in wet ponds
- Truck to haul away debris

## 4.4. Erosion

**Issue Applies Most Commonly To:** Sheetflow/Disconnection, Swales, Bioretention, and Ponds/Wetlands

**Problem: Erosion on practice surface, inlets, and/or outlets**

**General Approach for All Practices:**

- See **Section 4.10 – Embankment and Overflow Condition** for how to repair erosion on side-slope embankments.
- Rill and gully erosion occurs when runoff flow is concentrated. Deep rills and gully erosion on the practice surface **(top photo)** will require the surface to be regraded to make uniform again. Use the lightest equipment possible in order to minimize soil compaction during excavation.
- After excavation, reseed/plant the area with ground cover that is appropriate for the moisture conditions of the practice. Amend or enhance soil as needed according to a soil test; soil may need more organic material to support plants.
- To prevent further erosion on the surface of the practice, ensure that flow from the inlets can spread out adequately and has enhanced energy dissipation features. This may require installing or enhancing a stone apron outlet protection that flares out and down to the level of the practice to slow and spread out the flow. Other options include check dams, energy dissipation devices, or an armored low-flow channel. A stilling basin **(bottom photo)** can also dissipate flow as it comes out of an inlet or outlet pipe. Apply similar treatments to any outlets that are experiencing erosion.
- Any sloped soils that are disturbed during excavation will likely need erosion-control matting to hold it in place while vegetation becomes established.

**Helpful Skills:**

- Landscaping/Gardening
- Consult with Cooperative Extension Office or independent laboratory for soil testing
- Skills with excavation equipment
- Knowledge of sediment and erosion control practices and resources appropriate for the area

**Equipment Typically Used for Fixing Erosion:**

- Rakes, shovels, wheelbarrows, and other "landscaping" equipment
- Light excavation or grading equipment for larger jobs
- Equipment to deliver, unload, and move stone and other materials around
- Plants and/or seed mix, plus a way to move and store plant stock without damaging it or drying it out

## 4.5. Departure from Design Dimensions

**Issue Applies Most Commonly To:** Swales, Bioretention, Ponds/Wetlands, Infiltration, and Sand/Organic Filters

**Problem: Practice dimensions have been altered**

**General Approach for All Practices:**

- Once constructed, the dimensions of an SMP may become altered from the original design for a variety of reasons. These reasons can include:
- The SMP was not constructed to the proper dimensions at initial installation.
- Sediment accumulation in the SMP reduces the intended storage volume of the practice **(top photo).**
- Redevelopment or regrading of the site encroaches into the footprint of the SMP.
- Dumping of leaves, trash, or other debris into the SMP reduces the intended storage volume of the practice.
- If it appears that the dimensions of an SMP have been altered, proceed as follows:
- Consult the original design or as-built plans and sizing computations for the SMP to identify the intended dimensions and storage volume of the practice. Measure the length, width, and depth of the practice to estimate the current storage volume. Calculate the difference in volume to determine whether it is significant enough to warrant restoring the practice to its original dimensions. If the loss in volume is greater than about 10%, this likely warrants action.
- If the SMP's original storage volume cannot practically be restored because of current site conditions, an additional SMP may need to be built elsewhere on the site in order to regain adequate storage and treatment volume for the site.
- For problems of dumping by individuals on or near the site, install "No Dumping" or similar signage to inform people that this is not an appropriate place to dispose of debris. Any debris that has already been dumped should be removed from the practice either by hand or with equipment.

**Helpful Skills:**

- Basic surveying
- Understanding stormwater design plans and sizing computations
- Stormwater management design
- Skills with excavation equipment and erosion and sediment control

**Equipment Typically Used to Investigate and Fix Dimensions:**

- Simple level or survey equipment, tape measure, and other tools to measure SMP dimensions
- Light excavation or grading equipment for larger jobs
- Rakes, shovels, wheelbarrows, and other "landscaping" equipment for small jobs
- Soil stabilization materials

## 4.6. Improper Flow Paths

**Issue Applies Most Commonly To**: Rainwater Harvesting, Sheetflow/Disconnection, Swales, Bioretention, Infiltration, and Sand/Organic Filters

**Problem #1: Flow intended to go into a practice is diverted by debris or grit buildup or capacity issues at inlets**

**Bioretention, Swales, Infiltration, Sand/Organic Filters:**

- Grit, sediment, leaves, and other debris builds up at curb inlets or other inlets, sometimes to the point where flow is diverted completely around the practice (photos above). This is a common issue for practices that rely on curb cuts or other small inlet structures to get water into the practice for treatment. A minor amount of debris may be OK and not affect the ability of water to enter the practice. However, be aware of conditions where flow *that is supposed to be treated* is diverted to a downgradient storm drain or other structures in such a way that the stormwater treatment is entirely or partially bypassed.

- In many cases, correcting the problem may simply involve removing debris or unclogging the inlet.
- However, this problem can be chronic if the inlet design is susceptible to clogging. This can occur if the slope from the inlet into the practice is flat and/or there are controllable sources of sediment and debris in the drainage area.
- For chronic problems, consider redesigning inlets to be more clog proof. One solution is to build in a 2 to 3-inch drop from the curb inlet onto a gravel or stone diaphragm along the edge of the practice (see example in photo are right).
- Inlets that are undersized for the flow coming to them should be enlarged and armored with an appropriate erosion-resistant lining.

**Rainwater Harvesting:**

- Water intended to be collected in rainwater harvesting systems is sometimes not delivered to the tank or cistern if the system of gutters, downspouts, pipes, etc. is not sized properly or if the first-flush diverter or vortex filter is not functioning correctly and diverting too much water away from the tank.
- As with inlets, this may simply be a matter of routine cleaning of gutters, downspouts, vortex filters, etc.
- It may also be a design or capacity issue, in which case, installing larger gutters or a more robust piping system may be in order.

Source: Rainwater Management Solutions 1

*Example of enhancing the gutter and piping system leading to a rainwater harvesting system*

| Helpful Skills: |
|---|
| • Basic surveying<br>• Typical landscaping skills using materials such as soil, rock/stone, edging material, mulch, etc.<br>• Light construction of gutters, downspouts, piping<br>• Some knowledge of first-flush diverter and vortex filter products |

## Problem #2: Flow is not uniformly accessing the entire treatment area

**Bioretention, Swales, Infiltration, Disconnection and Sheetflow, Sand/Organic Filters:**

**Improper flow path issues in this category include:**

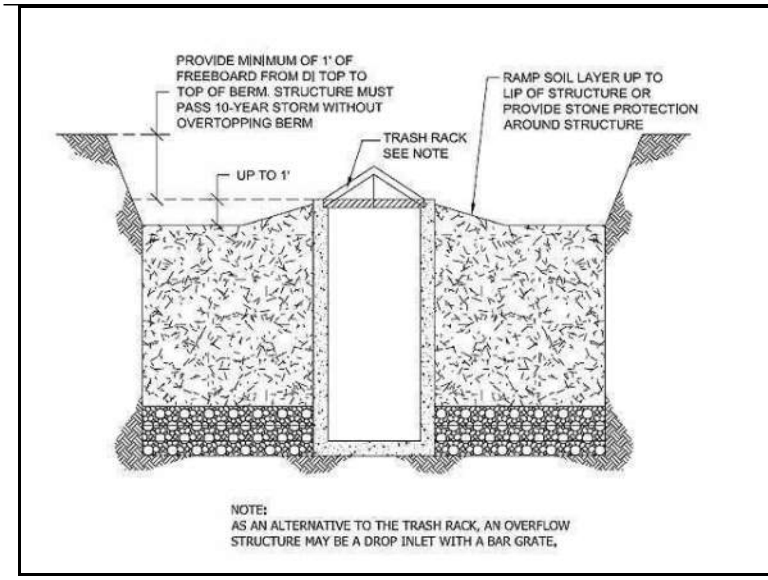
- Water forming channels or rills through the treatment bed of bioretention, swales, infiltration, or surface sand filters, and thus not spreading out across the treatment area surface
- Water ponding only at one end of the treatment area because the surface is not level
- Water piping through weak spots to an outlet or underdrain, such as where soil media meets a concrete structure
- See Section 4.4, Erosion for issues of channeling or erosion on the treatment surface.
- For uneven treatment area and preferential ponding, assess the severity of the problem. Compare the relative elevations of the "high" part of the treatment area (the area where water does NOT seem to pond) and any overflow structure or weir where high water flows will leave the practice. If there is still some freeboard (such that the overflow structure is higher than ALL of the treatment bed surface), then there will still be some ponding for larger rainfall events. Try some minor raking or moving soil media and mulch around to even out the filter bed.
- However, the problem is more serious if parts of the treatment area are higher than the overflow structure. These areas will never be valuable for treatment purposes. The treatment area is supposed to fill up like a bathtub, so some regrading is needed to level out the treatment area.
- If water is piping or shortcircuiting through the soil or sand media, forming sinkholes or otherwise bypassing the intended treatment mechanism, it will be necessary to repair these spots. Around concrete or metal overflow structures, use soil material right around the structure that can be compacted (bioretention soil media tends to be light, sandy, and fluffy and won't compact very well). Another option is to "ramp up" the soil layer to the lip of the structure so that there won't be a hydraulic jump at this potentially weak point. See the figure below.

**These three issues are illustrated below:**

*Water from the inlet at top of photo is channeling through the bioretention area.*

*Water is preferentially ponding only at one end of the bioretention because the surface is not flat.*

*Water is "piping" down to the underdrain at the weak spot where the soil media meets the concrete overflow structure.*

<table>
<tr>
<td>
</td>
<td>Ramp up soil layer to the lip of the structure to address this being a weak interface where water can work down and create bypassing. (Source: Virginia 2013 Stormwater BMP Specifications, Specification #9, Bioretention, Figure 9.13.)</td>
</tr>
</table>

**Impervious Disconnection:**

The most likely flow path issues with Impervious Disconnection are: (1) owners intentionally diverting downspouts away from pervious area and onto impervious area **(left photo below),** and (2) slight grading issues diverting the water away from the intended pervious receiving area **(right photo below).**

Both issues are fairly straightforward to address but involve communicating and working with property owners to explain the purpose of disconnection and how to properly maintain it. The second issue may involve some minor regrading or building low-profile berms to get water to flow to the intended disconnection area.

**Helpful Skills:**

- Rudimentary surveying
- Typical landscaping skills—using materials such as soil, rock/stone, edging material, mulch, etc.

**Equipment Typically Used for Inspecting and Fixing Flow Paths**

- Surveying equipment (i.e. Site level or total station) to get relative elevations among different parts of treatment area, inlets, overflow structures, etc.
- Small, simple tools—flat shovels, wheelbarrows, rakes, other common landscape/gardening tools
- Large, more complicated equipment—small excavators to move material around or do regrading. Always work from the side of the practice and NOT within the practice itself.

## 4.7. Sediment Buildup

**Issue Applies Most Commonly To**: Swales, Bioretention, Permeable Pavement, Ponds/Wetlands, Infiltration, and Sand/Organic Filters

**Problem: Sediment accumulation more than 2 inches thick covering 25% or more of the practice surface area**

**Bioretention, Swales:**

- Determine the source(s) of sediment. The most likely sources are: (1) premature installation of the practice during the construction process and discharge of construction site sediment loads; (2) erosion in the contributing drainage area *after* construction is complete; and (3) erosion along the practice side slope or within the practice itself. If it is an ongoing source, it must be abated (see **Sections 4.2, Contributing Drainage Area, and 4.4, Erosion).**
- Use a soil auger to auger holes in various places across the Bioretention or Swale surface area, especially in areas where sediment is accumulating. Determine how deep the sediment is penetrating into the soil media layer. Usually, it will be the top 2 to 3 inches that are most affected. Note that for swales *without* an engineered soil media, the sediment layer will likely be confined to the surface.
- Remove the "fouled" soil media to the affected depth (using flat shovels or small excavators and working from the side) and replace with clean material from an approved vendor (bioretention soil media or equivalent). If no vendors are available in your area, use the soil media specifications from the **Design Manual** to replicate the right mix of sand, topsoil, and composted organic material.
- Check to ensure that the practice is filtering at the proper rate after the next several storm events.

**Infiltration:**

- For infiltration practices excavated to a suitable infiltrating soil layer (e.g., not stone reservoir layer), use the same procedures as for Bioretention/Swales above.
- For infiltration trenches and basins that have a stone reservoir layer, use similar procedures, but use a shovel to dig into the stone layer to ascertain how deep the sediment incursion is into the stone. Remove down to this layer and replace with clean material.
- If the infiltration practice is clogged, see **Section 4.8: Clogging.**
- As with Bioretention, check for controllable sources of sediment in the Drainage Area (**Section 4.2**).

**Permeable Pavement:**

- NOTE: Routine sweeping with a regenerative air vacuum (maximum power 2,500 rpm) is important to avoid more costly repairs that result from deferred maintenance. It is best to sweep the pavement surface in the early spring after winter sanding/salting materials or snow piles have led to sediment or winter slag accumulation. Also, if the area is surrounded by tree canopy, fall cleanup is essential, as vegetative debris tends to get pulverized by vehicle traffic and ground into the pavement surface.
- Observe the pavement surface during a storm event to see whether the sediment is clogging the pavement (i.e., standing water on the surface after the storm stops). If so, see **Section 4.8: Clogging.**
- Remove several of the paver blocks in different parts of the structure to ascertain how deep the sediment is penetrating into the bedding and reservoir layers. Most of the time, sediment incursion will be limited to the top 1 or 2 inches of the pavement bedding layer (for permeable interlocking concrete pavers and concrete grid pavers).
- Based on the above observations, it may be worthwhile to quantify the infiltration rate using ASTM C-1701/1701M. This is most useful in conducting the test in the *same place within the pavement surface through the course of several years* to document reduction in infiltration rates. Repair or restorative sweeping is warranted when infiltration rates drop below around 10 inches per hour. NOTE: As stated above, this can likely be avoided if routine annual sweeping is conducted.
- If sediment covers more than 25% of the surface, is deeper than 2 inches, or vegetation is starting to grow where sediment has accumulated, consult a street-sweeping vendor about *restorative* sweeping. In this case, it will be necessary to use a higher RPM sweeper or vacuum sweeper to suck out more of the bedding pea gravel that has been fouled, then replace with clean material.

*Infiltration test using ASTM C-1701*

*Pulling grass and weeds from the joints can damage parking surface if roots are firmly established in the bedding layer.*

- Vegetation growing in the pavement joints should be removed either manually or with a water-safe herbicide (e.g., glysophate without surfactants). It is important to not let weeds proliferate in the pavement surface because pulling them out by the roots may damage the pavement structure. (Note: The application of herbicides to control invasive or undesirable vegetation within wetlands or other waters of the U.S. may require an Aquatic Pesticide Permit from the NYS DEC)
- Check the pavement surface after a storm event to ensure that it is draining properly.

The North Carolina State University (NCSU) Stormwater Engineering Group has an informative Urban Waterways publication, *Maintaining Permeable Pavements (2011):*
**http://www.bae.ncsu.edu/stormwater/pubs.htm**

*Routine, air-vacuum sweeping in the early spring and fall is the best approach for permeable pavement maintenance (Photo source: Toronto and Region Conservation)*

**Ponds and Wetlands:**

- Sedimentation is an inevitable process in ponds and wetlands. NOTE that upstream erosion, especially along stream channels or ditches leading to the practice will accelerate the sedimentation process and lead to more frequent and costly sediment removal operations. Whenever possible, it is important to mitigate any upstream erosion issues.
- Forebays and/or pre-treatment areas should be cleaned out when they reach 50% of their design capacity. Once cleanout is complete, it will be worthwhile to install a graduated rod into the forebay with a clear marking of future sediment clean-out levels.
- The main body of a pond or wetland may need to be dredged on an infrequent basis or when sediment has replaced 50% of the design capacity. There are many dredging methods available. Excavators with long arms can handle most small or moderate-sized ponds. Other methods may be necessary for larger facilities. Dredging can be a complicated operation involving dewatering, storage of wet sediment, and possibly hauling to on-site or off-site disposal or reuse areas. Consult a qualified contractor to explore available methods and costs for the particular application. Once again, installation of a graduated rod can help mark future clean-out levels. Note: The dredging of accumulated sediment within regulated wetlands, ponds or at outlet structure may require permits from NYS DEC and/or USACE. In addition, removed sediment should be properly disposed of in a regulated solid waste management facility or in an upland area that is at least 100 feet from regulated wetlands or streams. Sediment managed in upland disposal areas shall be graded, seeded and mulched.

**Sand/Organic Filters:**

- See the section above on Bioretention/Swales as some of the procedures will be similar, especially for above-ground filters. It is important to determine whether the drainage area is generating a controllable source of sediment that can be abated.
- Underground trench or vault filters will require routine maintenance to: (1) remove accumulated sediment, trash, and floatables from the sedimentation chamber, usually with a vac truck; and (2) remove sediment, grit, and sludge from the top layer of the filter media and replace with clean material. NOTE: Depending on the configuration of the underground filter, confined-space procedures may apply. For a normally operating practice, these maintenance tasks should be conducted every two to three years. If the filter is treating a stormwater hotspot or a particularly dirty drainage area (e.g., vehicle maintenance, washing, repair), the frequency may increase to annually or more often, as dictated by Level 2 inspections. Also, in these cases, it may be warranted to test the material to ensure proper disposal.
- Some proprietary filters require replacement of special cartridges or filter material. Consult the vendor or manufacturer for special maintenance procedures.

*Routine cleaning of a perimeter or “Delaware” sand filter. This can be done from the surface, but deeper, vault-type filters will require confined-space entry procedures.*

**Helpful Skills:**

- Most common contracting skills
- Excavation, dewatering, and sediment disposal in some cases
- Knowledge of maintenance equipment, such as vac trucks, street sweepers, etc.
- Knowledge of preferred conditions for bioretention soil media
- Soil testing in some cases where sediment is being removed from stormwater hotspots

**Equipment Typically Used for Sediment Removal Activities:**

- Small, simple tools—flat shovels, wheelbarrows, rakes, other common tools
- Larger jobs—small or large excavators, loaders, dewatering equipment (pumps, dirt bags, etc.), trucks to haul material to on-site or off-site disposal or reuse areas, erosion and sediment-control supplies.

## 4.8. Clogging

**Issue Applies Most Commonly To**: Bioretention, Permeable Pavement, Infiltration, and Sand/Organic Filters

**Problem: Filter media clogged; water standing on practice surface for 48 to 72 hours or longer after a storm**

**Bioretention:**

Standing water on the bioretention surface 48 to 72 hours after a storm event is a sure indication of clogging (top photo). Clogging of bioretention practices can be tricky to diagnose as there are several probable causes:

a. Clogged underdrain
b. Filter fabric between soil media and underdrain stone
c. Too much sediment/grit washing in from drainage area
d. Too much ponding depth
e. Improper soil media

The following procedure can be used to work through diagnosing the most common causes, beginning with the simplest and easiest to fix and progressing through more complex remedies:

1. Look for a thin, crusty layer of sediment that covers some or all of the soil media. It is often grayish in color. This thin layer can sometimes be enough to cause slow drainage. Scrape this crust off and ascertain sources of sediment in the drainage area (see Section 4.2, Contributing Drainage Area). Often, this problem can be caused by the bioretention soil media being installed too early in the construction process, but other chronic sediment sources should also be checked.
2. Open the underdrain cleanout and pour water in to verify that the underdrains are functioning and not clogged or otherwise in need of repair. The purpose of this check is to see whether there is standing water all the way down through the soil. If there is standing water on the surface, *but not in the underdrain*, then there is clogging somewhere in the soil layer. If the underdrain and cleanout have standing water and there is not water coming out the other end (outlet) of the underdrain pipe, then the underdrain is clogged and will need to be rooted out.
3. Use a soil auger to auger several holes down through the soil media to the underdrain layer (if present) or underlying soil. Check to see whether there is a layer of filter fabric at the bottom of the soil layer. The auger will pierce through any filter fabric that is present, and pieces of fabric in the auger bucket should be removed. Notice if the fabric is “blinded” or clogged with sediment. This is a common issue with older bioretention practices. If the practice has a clogged the filter fabric layer, go to step #6, install wick drain.

*Filter fabric, where present, is a likely source of clogging.*

4. While checking for filter fabric in auger holes, also note whether there is a layer of saturated soil media or bad soil media (e.g., too much clay content) that may be on top of a good media layer. This will be fairly obvious as the top 3 or 4 inches will be mucky and saturated, with dry and sandy media below. If this is the case, it will be necessary to remove the bad material and replace with good, clean bioretention soil media in accordance with the design specifications. Till or incorporate the good material into the underlying existing soil media to establish a good contact.

5. If the entire profile of soil media is bad, has too much clay content, or does not appear to meet the specifications for soil media, it will be worthwhile to test the soil and compare against the recommended specifications (e.g., clay content, particle sizes, etc.). If the soil does NOT meet specifications, see steps #6 and #9 below.
6. If the problem appears to be filter fabric or bad soil media (steps #3 or #5 above), there is a critical decision to be made. It is an expensive proposition to dig up the entire facility to either remove the filter fabric or replace the entire soil layer. If the clogging problem is not severe in nature, an intermediate (and much cheaper) option may be to install wick drains. Using a 6-inch auger bucket, auger numerous vertical holes around the practice surface area, making sure to auger all the way down to the underdrain stone or underlying soil (if there is no underdrain). Hammer 6-inch perforated PVC or other type of pipe into these holes. Perforations should be about 3/8-inch diameter. Fill the pipes with clean underdrain gravel (#57 stone) mixed in with coarse construction sand. These drains will serve to wick fines from the surrounding soil media and will provide alternative drainage. Check after the next several storm events to see whether the wick drains improve drainage.

*Adding sand to a wick drain. The vertical perforated PVC pipe has already been placed in the auger hole.*

7. Sometimes the cause of saturated soil media is springs or some type of baseflow coming into the practice. This is a more difficult problem as bioretention is not supposed to receive this type of constant flow. It will be necessary to identify and reroute springs or baseflow or perhaps replace the bioretention practice with a different type of practice.
8. Another possible source of poor drainage or clogging is that there can be too much water on top of the soil media when the bioretention practice fills up. Most specifications call for a maximum ponding depth of 12 inches, but sometimes the ponding depth can be 18 or even 24 inches. While this increases the amount of head pushing water down through the soil media, it can also lead to compaction or too much sediment building up. If the bioretention practice has a ponding depth greater than 12 inches, consider configuring the outlet or large storm overflow to reduce the ponding depth to 12 inches or less. Check with the local stormwater authority to ensure that doing this will not compromise the required treatment volume of the practice.
9. If clogging is too severe to be fixed with wick drains or other remedies listed above, it may be necessary to rebuild the bioretention practice by digging up the existing soil, taking out any filter fabric that is between the soil media and underdrain stone, and rebuilding and replanting according to the design specifications.
10. Whatever the chosen remedy, check to ensure that the practice is filtering at the proper rate after the next several storm events.

The Chesapeake Stormwater Network (CSN) has produced an excellent reference guide for inspecting and diagnosing Bioretention issues, *Technical Bulletin #10, Bioretention Illustrated.* This tool can be used as an additional reference and can be downloaded using this link: http://chesapeakestormwater.net/category/publications/

**Infiltration:**

- Clogging of infiltration practices can be simple to resolve or fatal:
- On the *simple* side, clogging (or poor drainage) may arise from sediment, vegetative debris, parking lot grit, or other debris clogging the top few inches of soil or stone.
- With luck, the practice will have an observation well (vertical perforated PVC pipe with cap that extends through the stone reservoir in an infiltration trench or basin). Check the observation well three days after a storm event of ½-inch or more. If water is standing in the observation well to the surface, then the whole profile may be clogged (see below under *fatal*). If the observation well has only a few inches or no water and there is still water standing on the surface, then surface clogging is a likely culprit.
- For infiltration practices in soil (no stone reservoir), auger several holes around the infiltration surface area. If saturated soil seems to be on top of good, clean, dry soil, then surface clogging seems likely.
- For infiltration trenches and basins with a gravel reservoir, dig several holes around the surface to determine, again, whether there seems to be a layer of gravel clogged with sediment, leaves, vegetative debris, parking lot grit, etc. If possible, dig down to where the gravel meets the underlying soil to see whether a layer of filter fabric is present (which may be common with older practices). If this is the case, blinding of the filter fabric may be a cause of the clogging.
- For surface clogging, remove the affected material down to the level where the soil or gravel seems clean, and replace with clean material. If filter fabric seems to be a problem, it will be necessary to dig up the gravel, remove the filter fabric, and rebuild the reservoir layer in accordance with the current design specifications. In either case, check after a storm event to ensure that this has resolved the issue.
- On the *fatal* side, the underlying soil may not be suitable for infiltration, either due to soil characteristics, compaction during construction, or other causes. Check the original design package to see whether any soil testing was done at the time. It may be worthwhile to auger down to the infiltration interface layer (e.g., where stone reservoir meets the underlying soil and then another several inches below this interface), and take several soil samples for lab analysis to compare to current soil specifications (see information below about infiltration soil analysis).

- It may be that a geotechnical analysis would reveal that there is a good infiltration soil layer, but it is lower than the existing interface. This would still require a complete rebuild and excavation down to the suitable soil layer. Restoring porosity at the designed elevation would require replacing soil above this suitable layer and avoiding compaction.
- Another option would be to convert the practice to a bioretention practice with an underdrain. Check with the local stormwater authority to see whether this would require any site plan or stormwater plan amendments or other permits.
- Many updated state stormwater manuals and specifications include protocols for infiltration soil testing and analysis that reference various ASTM standards. For example, see: *Virginia 2013 BMP Standards & Specifications, Specification #8: Infiltration, Appendix 8-A, Infiltration and Soil Testing* at: **http://www.deq.virginia.gov/fileshare/wps/2013_DRAFT_BMP_Specs/**

**Permeable Pavement:**

- AS NOTED IN SECTION 4.7 – sediment buildup, routine sweeping with a regenerative air vacuum (maximum power 2,500 rpm) is important to avoid more costly repairs that result from deferred maintenance. Preventative maintenance is the best and most cost-effective way to prevent clogging in the first place.
- If there is standing water on the pavement surface 48 to 72 hours after a storm event of ½-inch or more, then the pavement surface is clogged.
- Check the design plan or as-built plan to see whether the permeable pavement design includes an underdrain. There may also be underdrain cleanouts at the edge of the permeable pavement.
- If there is an underdrain, the first thing to check is whether the underdrain is clogged, crushed, or broken. Check to see whether there is standing water in the underdrain cleanout 48 to 72 hours after a storm event. If the underdrain is dry, pour water into the underdrain with a hose and see whether it comes out the other end. If the underdrain is clogged, snake it out, as this is the first and easiest thing to try.
- If the underdrain is working, then clogging may be due to: (1) clogged surface or bedding layer; or (2) underlying soil is not suitable for infiltration for designs with no underdrain. First, refer to the guidance in Section 4.7 – Sediment Buildup, and then proceed as follows:
- IF THERE IS NO UNDERDRAIN AND THE DESIGN IS BASED ON SOIL INFILTRATION UNDER THE PAVEMENT, it will be worthwhile to check the soil because unclogging the surface layer will likely not fix the problem. Check the original design package for any soil infiltration testing. It is likely worthwhile to remove the entire pavement section in several places down to the soil layer and to do a geotechnical investigation of the soil profile. See: ASTM C-1701/1701M and/or *Virginia 2013 BMP Standards & Specifications, Specification #8: Infiltration, Appendix 8-A, Infiltration and Soil Testing* for examples of soil infiltration protocols (URL above).
- If the soil is not suitable for an infiltration design, it will probably be necessary to rebuild the pavement using an underdrain design or possibly adding subsurface drainage along the perimeter of the parking area.
- IF THERE IS AN UNDERDRAIN OR THE SOIL IS SUITABLE FOR INFILTRATION, the best approach to try to unclog the pavement is restorative sweeping with a vacuum sweeper. Regenerative air sweepers may not have enough suction to relieve the clogging.
- If vacuum sweeping is not successful, it may be necessary to rebuild any layers fouled with sediment and fines. It is likely that this will be confined to the bedding layer and gravel used in the paver stone joints, but some clogging can possibly move down into the underlying stone reservoir layer.
- The North Carolina State University (NCSU) Stormwater Engineering Group has an informative Urban Waterways publication, *Maintaining Permeable Pavements (2011):* **http://www.bae.ncsu.edu/stormwater/pubs.htm**

*Water standing on the parking surface 48 to 72 hours after a storm is an indication of clogging. Snow piles at the edge of the photo point to possible clogging from winter sanding or plowing.*

**Sand/Organic Filters:**

*Standing water on the parking lot is evidence that this perimeter sand filter (under the sidewalk) is clogged.*

- See the section above on Bioretention/Swales as some of the procedures will be similar, especially for above-ground filters.
- Also see Section 4.7 – Sediment Buildup for guidance on routine maintenance of the sedimentation and filter chambers.
- As with Bioretention, there can be various causes for clogged filters:
- Filter fabric layer under the filter media that has blinded or clogged
- Clogging of the surface of the filter layer or filter cartridges
- Bad filter media (e.g., sand or organic media)
- "Plumbing" issues with configuration of overflow and underdrain pipes
- Fortunately, filters are usually confined within concrete vaults or manholes, so diagnosing and rectifying clogging problems should be more straightforward. Check the original design or as-built plans. Some of the following guidance may also be helpful:
- For proprietary cartridge or special filter media structures, consult the vendor or manufacturer for recommended solutions.
- See Section 4.7 for guidance on removing the top layer of filter media and replacing with clean material, as well as vacuuming out any sedimentation chambers.
- If it is suspected that overflow or outlet pipes are not configured correctly, check against the design plans and also standard drawings from the manufacturer.
- Chronic clogging problems are likely due to excessively dirty drainage areas, including uncontrolled sources of sediment, oil and grease washoff, vegetative debris from surrounding trees or shrubs, or other sources. It will be important to check and resolve any controllable sources of clogging in the drainage area (see **Section 4.2 – Contributing Drainage Area**).

**Helpful Skills:**

- Soil infiltration analysis techniques as per ASTM and/or current BMP design specifications
- Excavation, dewatering, and sediment disposal in some cases
- Knowledge of maintenance equipment, such as vac trucks, street sweepers, etc.
- Knowledge of preferred conditions for bioretention, sand/organic filter media, or standard permeable pavement types and bedding layers
- General practice of trying easier or less expensive strategies before jumping right to wholesale reconstruction of a practice

**Equipment Typically Used for Unclogging Activities:**

- Soil infiltration testing or geotechnical equipment
- Small or large excavators, loaders, dewatering equipment (pumps, dirt bags, etc.), trucks to haul material to on-site or off-site disposal or reuse areas, erosion and sediment control supplies
- Pavement demolition and repair equipment
- Mulch, plants, filter media, and other materials needed to rebuild practices

## 4.9. Vegetation

**Issue Applies Most Commonly To**: Swales, Tree Planting, Bioretention, Green Roofs, and Ponds/Wetlands

**Problem #1: Not enough vegetation; vegetation *is unhealthy***

**Bioretention, Swales, Tree Planting:**

- Test soil/media to ensure proper conditions exist for plant survival.
- Check water drawdown after a storm to make sure that wet/saturated conditions are not the cause of plant failure. If this IS an issue, see **Section 4.8 – Clogging.**
- Amend or enhance soil as needed; soil may need more organic material to support plants, but do NOT use uncomposted organic material or animal waste, as it will likely export undesirable nutrients to the stormwater system.
- If plants have continued to die, consider a different species or entire planting palette or revised planting plan **(photo to right shows the need for a whole new planting plan)**. Also consider using an appropriate bioretention or swale native seed mix to supplement use of plugs or other nursery stock.
- Consult a horticulturalist or plant nursery if there is evidence of disease or pests.
- Replant and add mulch or ground cover as needed.

**Ponds and Wetlands:**

- See **Section 4.13 – Pool Quality** for general guidance on pond and wetland vegetation maintenance, as well as the following.
- For emergent vegetation, determine whether water depths are too deep or shallow for survival (i.e., depths are different from design depths, or original design included improper vegetation).
- If a small amount of supplemental vegetation is needed, plant wetland plugs per nursery guidance.
- For large-scale plantings, drain the permanent pool and plant during the early spring.

**Green Roof:**

- Consult with a green roof plant vendor about possible causes of plant failure. Lack of watering during initial establishment could be the main culprit.
- Work with a qualified vendor to develop and install a new planting plan.
- Speak with building facilities maintenance personnel to ensure they understand need for watering and caring for new plants after they are installed.

**Helpful Skills:**

- Landscaping/gardening
- Consult with Cooperative Extension Office or independent laboratory for soil testing
- If original planting plan is deemed inadequate, consult a landscape architect or horticulturalist to determine whether a revised planting plan is needed.
- Knowledge of native plant and/or wetland plant nurseries in general region

## Problem #2: Too much vegetation, overgrown (with invasive species), not maintained

**General Approach for All Practices:**

- Determine which invasive plants are present. For a list of regulated and prohibited invasive plants in New York State, see *New York State Prohibited and Regulated Plants* (NYS DEC, NYS Agriculture and Markets, 2014) at: http://www.dec.ny.gov/docs/lands_forests_pdf/isprohibitedplants2.pdf . Invasive plants shall be properly disposed of in a manner that renders them non-living and non-viable to prevent the establishment, introduction or spread of disposed species.
- Review whether the original planting plan relied on these plants; for example, some wetland plans may rely on “aggressive colonizers” such as cat tails.
- For more detailed information regarding appropriate control measures for each species, consult the Cornell Cooperative Extension Invasive Species Program at the following link: http://ccetompkins.org/environment/invasive-nuisance-species/invasive-plants. If invasives have taken over the facility, wholesale removal and replanting with desirable species may be necessary.
- If (non-invasive) plants are overgrown, (**example in photo to right**), remove, thin, or trim back excessive vegetation.
- If an entire new planting plan is deemed necessary, use SMP-Specific Guidance in the remainder of this manual, along with landscaping goals for the site location, to devise a plan that allows for adequate growth over a long period of time. A simple, clear planting design (**example in photo below**) with a long-term plan has the best chance of being maintained through time. Maintenance crews need to know which plants are part of the design versus weeds and how the practice should look from year to year.
- Develop a plan to ensure proper weeding, pruning, trimming, and replanting to maintain the plan over time.
- See **Section 4.13 – Pool Quality** for general guidance on pond and wetland vegetation maintenance, as well as the following.

**Helpful Skills:**

- Knowledge of exotic and invasive species is needed. Consult a local Cooperative Extension Office.
- Specific measures may include mechanical hand pulling, regrading (requires construction equipment), or herbicide/pesticide application *safe for aquatic environments*.
- Landscape architect
- Knowledge of wetland plants (for ponds/wetlands)
- Knowledge of SMP design (to understand hydrologic regime for plant selection)

**Equipment Typically Used for Vegetation Maintenance Activities**

- Soil auger to diagnose issues of soil drainage that may affect vegetation health
- Rakes, shovels, wheelbarrows, and other “landscaping” equipment
- Light excavation or grading equipment for larger jobs
- Equipment to deliver, unload, and move soil media, mulch, and other materials
- Plants and/or seed mix, plus a way to move and store plant stock without damaging it or drying it out
- Planting bars, soil drills, etc.
- For planting in standing water (e.g., ponds, wetlands), pumps or pump-around systems and dirt bags or other ways to temporarily dewater planting area

# 4.10. Embankment and Overflow Condition

**Issue Applies Most Commonly To**: Swales, Bioretention, and especially Ponds/Wetlands

## Problem #1: Rill and channel erosion and bare dirt areas of embankments

**Bioretention, Swales:**

- Erosion and areas of bare dirt indicate two basic issues: 1) soils and moisture levels are not suitable for the plants or turf used; and 2) vegetation cannot take hold because of concentrated flow, physical wear, or poor soil conditions. Address these issues first with a soil/media test to ensure proper conditions exist for plant survival.
- High salt content from winter deicing of pavement is a common culprit of poor soil conditions for roadside plants. If this is the case, restore area with plant species that can tolerate salt levels, or replace edge plants with a stone diaphragm to intercept runoff from road.
- Amend or enhance soil as needed; soil may need more organic material to support dense ground cover.
- For concentrated flow and physical wear, redirect concentrated flow so that it disperses in mulched and vegetated areas. Stake in mulch and replant with vigorous plants recommended through the soils test.
- If plants have continued to die, consider a different species or entire planting palette or a revised planting plan (see **Section 4.9 – Vegetation and photo to right)**. Also consider using an appropriate bioretention or swale native seed mix to supplement use of plugs or other nursery stock.
- Consult a horticulturalist or plant nursery if there is evidence of disease or pests.
- Replant and add mulch or ground cover as needed.

**Ponds and Wetlands:**

- Where erosion has deposited soil within the pond or wetland water line, remove this material and reshape the slope.
- If a small amount of supplemental vegetation is needed, plant wetland plugs per nursery guidance.
- To address rill and channel erosion, first obtain a soil sample test to get soil amendment recommendations. Undercut the eroded sections and replace with clean amended soil, based on the soil test, and reseed as appropriate for the season.
- It may be necessary to stake in seed blankets or erosion-resistant lining (e.g., erosion-control matting or even rock in extreme situations) to stabilize eroded areas. Again, choose seed types appropriate for the season.
- Based on soil test guidance, reseed bare areas to prevent further erosion.
- For persistent problems, reroute the flow to more stable receiving areas using berms, diversions, etc.

**Helpful Skills:**

- Landscaping/gardening
- Consult with Cooperative Extension Office or independent laboratory for soil testing.
- If original planting plan is deemed inadequate, consult a landscape architect or horticulturalist to determine whether a revised planting plan is needed.
- Knowledge of sediment and erosion control practices and resources appropriate for the area

## Problem #2: Settlement, loss of armoring material, erosion of emergency overflow

**General Approach for All Practices:**

- Settlement, loss of armoring material, erosion and accumulated debris can affect the dimension, water velocity or capacity of the emergency overflow such that embankment failure could occur in flood events (**photos below**).
- Inspect for exposure of soil or geotextile base material in the overflow and rearmor areas of exposure.
- In cases of settlement, a qualified engineer should be sought to assess its capacity and impact on pond capacity.
- Erosion of spillways should be repaired and revegetated as described for embankments.

**Helpful Skills:**

- Knowledge of sediment and erosion control practices for the area
- Completion of self-guided training on dam safety through Association of State Dam Safety Officials: http://www.damsafety.org

## Problem #3: Impounding structure (embankment or dam) integrity issues due to tunneling or digging animals, woody vegetation or seepage

**Ponds/Wetlands:**

- Impounding structure stability is a serious concern, especially where trees have become established on the slopes, or there's evidence of animal burrows or seepage.
- The best approach for trees on the crest, slopes, and adjacent to an impounding structure or embankment is to cut them down before they reach significant size. If large trees have been cut down but their root systems not removed, carefully monitor the area around the remaining stumps for signs of seepage.
- Exercise judgement for trees on the surrounding side slopes that are NOT impounding structures (not designed to hold back water in the pool). Sometimes a forested edge can enhance the appeal of a pond, but access for maintenance must also be available, and some trees can drop debris into ponds, leading to quality issues.
- Animal burrows can be dangerous to the structural integrity of the embankment because they weaken it and can create pathways for seepage. Professional exterminators may be needed to trap and remove animal pests.
- Seepage as water flow or boiling sand on the lower portion of the exterior slope or toe area of an impounding structure should be brought to the attention of a qualified engineer.
- Leakage around conveyance structures such as barrel pipes or spillways should be monitored for increase since the last inspection. A qualified engineer is needed to resolve issues of piping or seepage along the barrel pipe through a dam.
- Turbidity or cloudiness in seepage should also be brought to the attention of a qualified engineer.

**Helpful Skills:**

- Completion of self-guided training on dam safety through the Association of State Dam Safety Officials: http://www.damsafety.org

**Equipment Typically Used for Embankment and Overflow Maintenance Activities**

- Excavation or grading equipment for larger jobs
- Equipment to deliver, unload, and move soil media, mulch, and other materials
- Plants and/or seed mix, seed blanket and erosion control materials
- Rod and level for settlement measurements
- Clear glass bottle for seepage visual test

## 4.11. Structural Damage

**Issue Applies Most Commonly To**: Any Practice

**Problem: Structural damage to pipes, headwalls, standpipes, inlet/outlet structures, grates, curbs, and other structural components**

- Structural components are necessary for water to flow into and out of stormwater practices as intended. This is a broad category that involves components composed of concrete, metal, plastic, and other materials. Some common examples include:
- Deteriorated or broken curbs that allow water to bypass a practice
- Slumping or sinkholes where soil meets a concrete drop inlet or outlet structure
- Broken or collapsed inlets
- Connections in an inlet or manhole structure that are not parged and are leaky
- Collapsed or crushed pipes (especially corrugated metal)
- Missing or broken steps or other safety features in a manhole or riser structure
- Root penetration and clogging of underdrain or other pipes
- Broken check dams
- There are too many particular instances to mention here, but the general idea is to inspect and repair any structural components that are affecting the performance of a practice or leading to a potential health or safety issue.

**Helpful Skills:**

- General contracting skills—concrete work, metal, proper joint sealing
- Routing out clogged pipes
- Perhaps CCTV experience to look for broken or clogged pipes

**Equipment Typically Used for Fixing Erosion:**

- General contracting
- CCTV

## 4.12. Pool Stability

**Issue Applies Most Commonly To**: Ponds/Wetlands

**Problem: Flooded or dry pond – outlet issues**

**General Approach for Ponds and Wetlands:**

- Note high-water marks on structures or pond banks and compare with outlet structure weir.
- If the outlet weir is submerged, investigate downstream for plugs such as beaver dams, woody debris or sediment bars. Refer to **Section 4.3 – Physical Obstructions** for removal of obstructions.
- If the pond is retaining more water than it is supposed to and there is no flow from the outlet with no visible blockages in the outlet pipe, look for obstructions above the weir or outlet pipe. Woody debris, vegetation and silt can plug outfall weirs or blind rock outfall protection. Removal of such blockages tends to be a hand exercise. A jet/vacuum truck or other heavy equipment may be needed to clear excessive or precarious blockages (**photo on right**).
- If the pond is too low and not holding water in the designated pool, the outlet structure should be closely inspected to see whether it has settled from the original construction or there is leakage through joints or cracks. Finding no deficiencies with the structure, investigate the pond embankment as described in **Section 4.10** for evidence of seepage.
- If there is no evidence of seepage and the outlet structure has no apparent structural defects, an engineer should be consulted to review the pond design and determine the proper outlet elevation.

**Helpful Skills:**

- The ability to navigate uneven surfaces, to follow ditch banks and to sight drainage obstructions is implicit with this task.
- Ability to use a level to sight adequate elevation fall is helpful.

**Equipment Typically Used for Pool Stability Evaluations**

- Bright flashlight for pipe inspection
- Manhole hook for manhole cover access
- Brush hook to clear debris and walking surfaces
- Rod and level to check elevation differentials

## 4.13. Pool Quality

**Issue Applies Most Commonly To**: Ponds/Wetlands

**Problem #1: Littoral shelves and pond edge: not enough vegetation; vegetation *is unhealthy;* invasive plants have taken over**

**Ponds and Wetlands:**

- If there is not enough vegetation or no vegetation, determine whether maintenance practices have killed the plants. If so, work with the owner to educate those responsible for pond maintenance on correct methods. Consult plans for original planting and replant.
- For emergent vegetation, determine whether water depths are too deep or shallow for survival (i.e., depths are different from design depths, or original design included improper vegetation).
- If a small amount of supplemental vegetation is needed, plant wetland plugs per nursery guidance.
- For large-scale plantings, drain the permanent pool and plant during the early spring.If ponds are overgrown so that less than 25% of the surface area is visible, the pond water level should be lowered to enable selective plant removal.
- Invasive plants, such as phragmites or common reed, should be removed with their roots. Be sure to restore areas that have been disturbed with replacement vegetation because root removal exposes soil to erosion. Invasive plants shall be properly disposed of in a manner that renders them non-living and non-viable to prevent the establishment, introduction or spread of disposed species.
- Native plants selected based on environmental conditions have the greatest chance for survival.
- Consult a horticulturalist or plant nursery if there is evidence of disease or pests.

**Helpful Skills:**

- Landscaping/gardening
- If original planting plan is deemed inadequate, consult a landscape architect or horticulturalist to determine whether a revised planting plan is needed.
- Knowledge of native plants and/or wetland plant nurseries in general region
- Familiarity with New York invasive terrestrial and wetland plants and their control: http://nyis.info/

**Problem #2: Pond color, scum, odor, algae and plant overgrowth**


- Ponds that have algae covering more than 20% of the surface should have maintenance to remove it. Raking or mechanical harvesting of filamentous algae offers short-term control, but feasible long-term strategies should be considered.
- Pond maintenance companies should be relied on to identify the algae and appropriately control them. Pond specialists can control the algae growth in ponds, but its growth and reproduction are dependent on nutrients. When nutrients are in abundance, so will be the algae or vegetation.
- Plants can be used in shallow shelfs at inlets to take up nutrients, but they must be maintained and cuttings removed to take nutrients out of the pond system.
- If (non-invasive) plants are overgrown, remove or trim back excessive vegetation. Remove cuttings and trimmings. Do not allow vegetative debris to remain in the pond.
- Pond clarity and color can be impacted by excessive sediment discharge or flow shortcircuiting. For issues of clarity and color, follow the recommendations in **Section 4.7 – Sediment Buildup**.
- If invasive aquatic plants are identified, follow DEC guidelines for reporting and controlling invasives (see **Section 4.9 – Vegetation**).
- Some color, odor, and pond quality issues can be caused by leaks, spills, and other releases in the drainage area. Any petroleum odor or oily sheen (aside from natural rainbow sheen associated with decomposition of organic matter) should be reported to the appropriate state or local response agency. Other peculiar colors or odors can be investigated in collaboration with relevant agencies. Common issues are grease, paint, or other substances poured into storm drains, dumpster management, and stockpiles of various materials exposed to rainfall.

| **Helpful Skills:** |
|---|
| • Ability to recognize invasive aquatic plants<br>• Specific measures may include mechanical hand pulling, regrading (requires construction equipment), or herbicide/pesticide application *safe for aquatic environments*.<br>• Knowledge of wetland plants and common types of algae and aquatic weeds<br>• Knowledge of types of pond maintenance practices |
| **Equipment Typically Used for Pool Quality Investigations** |
| • High-top rubber boots<br>• Canoes or small boats<br>• Brush hook to clear vegetation and access pond bank<br>• Secchi disk to check and compare pond color and clarity<br>• Large-mouth bottle to collect algae and water quality samples<br>• Various materials to control aquatic weeds and algae |

# Section 5. Planning for Stormwater Maintenance

Often, stormwater practices fall into disrepair because there is no plan in place for ensuring that they are maintained over time. As a result, maintenance can become reactive in nature, resulting in high costs for repairing damaged practices or practices becoming ineffective over time. This section outlines some key elements of stormwater maintenance planning, including:

1. Program models for stormwater maintenance
2. Inspection and maintenance checklists
3. Planning for the costs of stormwater maintenance
4. Identifying the need for infrequent maintenance items

## 5.1. Program Models for Stormwater Maintenance

The Maintenance Hierarchy concept (See Section 1) is discussed throughout this chapter, but the individuals who will conduct the Level 1, Level 2 and Level 3 inspections and maintenance will vary depending on how the local program is administered. While this chapter does not focus on program elements, it is important to note that the local program requirements will influence who performs ongoing maintenance. This will play an important role in how to develop a comprehensive maintenance plan.

Although there are many options for implementing a stormwater plan, they can be described by three broad categories, including: 1) Private Maintenance; 2) Local Program; and 3) Hybrid Approach. Understanding the program in the local community will influence the best techniques for developing the maintenance plan (**Table 5.1**).

### Option 1: Private Maintenance

In this option, maintenance is the responsibility of the private land owner. In regulated MS4s, however, the land owner will periodically report to the local government. In this model, it is important to ensure that the maintenance plan is very easy to understand and includes pictures of key practice elements. If possible, include a list of contractors who will be able to perform maintenance items and how much these will cost. Finally, materials should point homeowners to resources so that they can learn more about the practices on their property. DEC’s Maintenance Photo Library and Training Materials webpage (link) can be useful tools for this purpose.

### Option 2: Local Government Maintenance

In this option, the local government takes over maintenance responsibility for all stormwater practices. While it is still important to develop a clear and simple plan, the designer can assume some level of training or supervision for the individuals conducting inspections and maintenance. For publicly maintained practices, it is helpful to find out what resources the local government has in place for developing the plan. These resources may be in the form of existing reporting and tracking procedures, which can be modified for the specific practice, or equipment such as vacuum sweepers. Maintenance access should be made available to local government staff through official easements.

### Option 3: Hybrid Approach

In the hybrid approach to stormwater maintenance, larger practices or practices on public land are maintained by the local government, and smaller practices on private property are maintained by the owner. There are other hybrid models, however. For example, the local government may take responsibility for inspections but leave the owner responsible for maintenance items identified during the inspection.

**Table 5.1 Maintenance Considerations for Three Program Options**

| Program Option | Inspection/Maintenance Performed By: | Key Considerations for the Designer |
|---|---|---|
| Option 1: Private | Level 1: Property owner or HOA<br>Level 2: Private Contractor<br>Level 3: Certified Contractor | Make the plan very simple and graphic intensive.<br>Include a list of contractors if applicable.<br>Provide links to educational materials. |
| Option 2: Local Program | Level 1: Interns or Untrained Staff<br>Level 2: Trained Local Staff<br>Level 3: City/Town Engineer or other individual hired by the city or town | Learn about the resources the local program has at its disposal.<br>If government staff are being trained, develop a maintenance plan that is consistent with their knowledge and understanding.<br>Be aware of equipment and materials on hand in this community. |
| Option 3: Hybrid Approach | Inspection is typically divided, where larger practices or those on private property are maintained by the public entity. | Understand how this maintenance is divided, and develop a plan that is consistent with this arrangement. |

### Special Considerations for Green Infrastructure Practices

Because many of the Green Infrastructure practices included in this manual, such as Tree Planting, Rain Gardens and Sheetflow and Level Spreaders, are implemented at a very small scale, they present a unique challenge in terms of stormwater maintenance. These practices are more likely to be located on private property. As a result, the designer needs to consider the *Private Maintenance* model. Maintenance plans for these small practices should be as simple as possible, and the designer should ensure that maintenance can be completed with readily available materials.

## 5.2. Inspection and Maintenance Checklists and Documentation

The checklists included in this chapter are specific to the maintenance hierarchy. The maintenance plan should include inspection checklists for all three hierarchies. In addition, these checklists should be modified to identify the specific practice elements included in each design. The materials developed as a part of the maintenance plan should be provided to the practice owner and local government. (See **Table 5.2**)

**Table 5.2. Customizing Checklists and Guidance**

| Hierarchy | Checklist/Checklist Guidance | Tips for Customizing |
|---|---|---|
| Level 1 | **Section 2** includes both the checklists and guidance. | Add photographs of the practice (once installed), and include a simple aerial photograph of the site to locate the practice.<br>Include key local government contacts and contractors along with the checklist. |
| Level 2 | **Section 3** includes guidance on how to respond to the Level 1 Inspection and/or activate a Level 3 investigation.<br>**Appendix B** includes routine inspection checklists for the Level 2 Inspector. | Modify to remove elements that are not in this particular practice. |
| Level 3 | Guidance is included in **Sections 3 and 4**. | Typically, this will not need to be modified. |

## 5.3. Budgeting for Maintenance

A maintenance plan should include a budget for annual maintenance. In the Public Maintenance model, a single entity (the local government) will be responsible for maintenance of many practices, so the cost of maintenance for an individual practice may not be as important as estimating the average cost of maintenance across all practices. For privately maintained practices, on the other hand, it is very helpful to develop a cost estimate that is as accurate as possible for the specific location. As a result, two options for estimating costs are presented here, including:

- **Option 1**: Average or Unit Costs
  Generalized cost data are used to estimate an annual cost. This option may be used for a municipality or other institution that manages a large number of practices.
- **Option 2:** Detailed Individual Practice Budget
  Annual costs are estimated using more detailed practice information, as well as more detailed estimates of labor and materials costs.

### Option 1: Average or Unit Costs

In this option, annual maintenance costs are estimated on a per-acre basis or based on a percentage of the construction costs. These prices typically range from about 1% to 4% of the construction costs (King and Hagan, 2011; **Table 5.3**).

**Table 5.3 Typical Maintenance Costs**
**(Source: King and Hagan, 2011; Adjusted to 2015 Costs)**

| Practice | Annual Maintenance Cost (% of Construction) | Annual Maintenance Cost ($/cubic foot of the water quality volume–WQV—treated) |
|---|---|---|
| Buffers | 4% | $0.25-$0.35 |
| Tree Planting | 4% | $0.35 |
| Ponds and Wetlands | 4% | $0.22-$0.35 |
| Infiltration Trench/ Basin | 2% | $0.25 |
| Filtering Practices | 4% | $0.41-$0.47 |
| Bioretention | 4% | $0.44 |
| Swales | 3% | $0.18-$0.26 |
| Permeable Pavement | 1% | $0.64-$0.89 |

While the costs in **Table 5.3** may be a reasonable starting point, it is important to note that the actual data will vary greatly, depending on labor rates and materials costs. For example, the hourly “Open Shop” labor rate for rough grading is approximately $27/hour in Elmira and $38/hour in New York City (Means, 2015). In addition, costs for labor, materials and equipment will vary depending on the maintenance arrangement (**Table 5.4**).

| Table 5.4 Variability in Maintenance Costs Based on Maintenance Arrangement | | | |
|---|---|---|---|
| **Maintenance Arrangement** | **Labor** | **Materials** | **Equipment** |
| **Public Maintenance (Municipality)** | Level 1: Intern Wage<br>Level 2: Staff Salary<br>Level 3: Professional Staff or Contractor | Low: Materials bought in bulk. | Low: Typically owned by Public Works or similar department. |
| **Private Maintenance (Homeowner)** | Level 1: Homeowner (Free) or Contractor<br>Level 2: Private Landscaper or Contractor<br>Level 3: Professional Contractor | High: Materials purchased in small quantities. | High: Specialized equipment needs to be rented if needed. |
| **Private Maintenance (Commercial or HOA)** | Level 1: Free (with HOA volunteers) or Contracted Labor Rate<br>Level 2: Private Landscaper or Contractor<br>Level 3: Professional Contractor | Varies: Materials may be bought in bulk or on a small scale, depending on the size of the private entity. | High: Specialized equipment needs to be rented if needed. |

## Option 2: Site-Based Costs

Because both the unit costs of labor and materials and the average annual costs of maintenance can be so highly variable, more detailed data will be needed to estimate costs at a particular site. One approach for estimating these costs is to generate a list of routine maintenance items, along with associated unit costs for labor, materials and equipment. This approach requires the user to enter basic design data for the practice, as well as information regarding local labor rates and other general costs. In the bioretention example below, unit costs are used to estimate routine maintenance costs, including inspections and regular maintenance.

## Example Annual Cost Estimation: Bioretention

An example cost estimation for a bioretention cell follows below. The cost estimation tool used in the Maintenance Chapter will be automated. This example demonstrates how the unit cost and typical frequency data will be used to estimate average annual maintenance costs. In it, we are estimating annual maintenance costs for a bioretention practice with characteristics summarized in **Table 5.5**. **Table 5.6** then summarizes activities, their frequency and extent, and associated labor costs.

Using the assumptions for this practice, the annual costs for routine maintenance would be $1,828 ($1.15/cubic foot of Water Quality Volume) in the first year and $1,468 ($0.90/cf WQv) in subsequent years. This value is much higher than the $0.44/cf estimated using general cost data (**Table 5.3**). However, significant cost savings could be realized by using volunteer or intern-level labor for Level 1 inspections and routine maintenance.

**Table 5.5. Assumptions for Bioretention Cost Example**

| **Practice Design** | | **Unit Costs** | |
|---|---|---|---|
| Water Quality Volume (cf) | 1,600 | Level 1 Labor ($/hr) | $15 |
| Forebay Volume (cf) | 400 | Level 2 Labor ($/hr) | $35 |
| Total Practice Area (sf) | 2,000 | Mulch ($/cy) | $10 |
| Filter Area (sf) | 1,000 | Plants ($/plant) | $1 |
| Ponding Area (sf) | 1,500 | Trash Tipping Fee | $25 |
| Slope Area (sf) | 500 | Seed/Mulch for a small area | $10 |
| Turf Area (sf) | No Turf | Average Cost for a PVC Replacement Part (Planning Level) | $100 |
| Inlets (#) | 1 | | |

## Table 5.6. Bioretention Example - Routine Maintenance Costs

| Task | Frequency (x/year, Decimal) | Typical Extent | Extent | Hours (Unit) | Hours/yr | Level | Materials and Equipment | Annual Costs | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Labor | Materials and Equipment | Total |
| Level 1 Inspection - 1 to 5-acre drainage | 1 | Practice | 1 | 1 per inspection | 1 | 1 | | $15 | | $15 |
| Level 2 Inspection - 1 to 5-acre drainage | 0.2 | Practice | 1 | 2 per inspection | 0.4 | 2 | | $14 | | $14 |
| Watering - grass and plants: Year 1 | 16 | Weekly for first growing season, over filter surface area | 1,000 | 0.5 per 400 sf area | 24 | 1 | Assume minimal cost for water | $360 | | $360 |
| Trash and Debris Removal | 4 | Ponding area | 1,500 | 1 per 400 sf practice surface area | 15 | 1 | Assume $25 Tipping Fee for Each Trip | $225 | $100 | $325 |
| Weeding | 2 | Assume 50% of practice area | 1,000 | 4 per 400 sf practice surface area | 20 | 1 | | $300 | | $300 |
| Mulching | 1 | Ponding area | 1,500 | 4 per 400 sf area | 15 | 1 | Bark mulch; assume 15 cy/application | $225 | $150 | $375 |
| Sediment Removal (minor) | 1 | Assume one small area per inlet | 1 | 1 per small area | 1 | 1 | | $15 | | $15 |
| Erosion Repair (minor) | 1 | Inlets; assume 25 sf/practice | 25 | 1 per 25 sf | 1 | 1 | Seed, mulch and topsoil | $15 | $10 | $25 |
| Erosion Repair (minor) | 1 | 10% of slope area | 50 | 1 per 25 sf | 2 | 1 | Seed, mulch and topsoil | $30 | $20 | $40 |
| Minor Regrading | 0.5 | 1 spot per 400 sf of practice area | 5 | 1 per repair | 2.5 | 2 | Assume done by hand | $88 | | $88 |
| Planting (plants) | 0.2 | Assume 50% of practice area | 1,000 | 8 per200 sf | 8 | 1 | Assume 500 plants/planting | $120 | $100 | $220 |
| Minor PVC or Metal Repairs (observation well cap, PVC riser, grates) | 0.2 | 1 per practice | 1 | 1 per repair | 0.2 | 2 | Assume about a $100 piece of equipment | $7 | $20 | $27 |
| Sediment Removal (small forebay) | 0.2 | per forebay | 1 | 2 per forebay | 0.4 | 2 | Assume removal by hand | $14 | | $14 |
| | | | | | | | **Total Costs - Year 1** | **$1,428** | **$400** | **$1,828** |
| | | | | | | | **Total Costs - Subsequent Years** | **$1,068** | **$400** | **$1,468** |

## 5.4. Planning for “Non-Routine” Maintenance

If the guidance provided in this chapter is followed and practices are designed properly, the routine maintenance (and budget guidance in **Section 5.3**) should be sufficient to keep a practice functioning indefinitely, but planning is needed for infrequent maintenance items. In the initial maintenance plan, identify a few of the most likely infrequent items. If initial routine inspections start to identify a more serious problem, develop a plan and budget for performing the repairs. To be more conservative, another option is to provide a contingency budget to plan for non-routine repairs over the life of the practice.

Note: Maintenance and repairs that rise to a Level 3 inspection may require permits from the NYS DEC and/or US Army Corps of Engineers if they are undertaken within or adjacent to regulated wetlands or other waters of the U.S.

# Appendix B – NYSDEC Stormwater Practice Inspection Checklists

## Stormwater Pond/Wetland Operation, Maintenance and Management Inspection Checklist

Project ____________________

Location: ____________________

Site Status: ____________________

Date: ____________________

Time: ____________________

Inspector: ____________________

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **1. Embankment and emergency spillway (Annual, After Major Storms)** | | |
| 1. Vegetation and ground cover adequate | | |
| 2. Embankment erosion | | |
| 3. Animal burrows | | |
| 4. Unauthorized planting | | |
| 5. Cracking, bulging, or sliding of dam | | |
| a. Upstream face | | |
| b. Downstream face | | |
| c. At or beyond toe | | |
| downstream | | |
| upstream | | |
| d. Emergency spillway | | |
| 6.Pond, toe & chimney drains clear and functioning | | |
| 7.Seeps/leaks on downstream face | | |
| 8.Slope protection or riprap failure | | |
| 9. Vertical/horizontal alignment of top of dam “As-Built” | | |
| | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 10. Emergency spillway clear of obstructions and debris | | |
| 11. Other (specify) | | |
| **2. Riser and principal spillway (Annual)** | | |
| Type: Reinforced concrete ______<br>Corrugated pipe ________<br>Masonry ________<br>1. Low flow orifice obstructed | | |
| 2. Low flow trash rack.<br>a. Debris removal necessary | | |
| b. Corrosion control | | |
| 3. Weir trash rack maintenance<br>a. Debris removal necessary | | |
| b. corrosion control | | |
| 4. Excessive sediment accumulation insider riser | | |
| 5. Concrete/masonry condition riser and barrels<br>a. cracks or displacement | | |
| b. Minor spalling (<1" ) | | |
| c. Major spalling (rebars exposed) | | |
| d. Joint failures | | |
| e. Water tightness | | |
| 6. Metal pipe condition | | |
| 7. Control valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 8. Pond drain valve<br>a. Operational/exercised | | |
| b. Chained and locked | | |
| 9. Outfall channels functioning | | |
| 10. Other (specify) | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| **3. Permanent Pool (Wet Ponds) (monthly)** | | |
| 1. Undesirable vegetative growth | | |
| 2. Floating or floatable debris removal required | | |
| 3. Visible pollution | | |
| 4. Shoreline problem | | |
| 5. Other (specify) | | |
| **4. Sediment Forebays** | | |
| 1.Sedimentation noted | | |
| 2. Sediment cleanout when depth < 50% design depth | | |
| **5. Dry Pond Areas** | | |
| 1. Vegetation adequate | | |
| 2. Undesirable vegetative growth | | |
| 3. Undesirable woody vegetation | | |
| 4. Low flow channels clear of obstructions | | |
| 5. Standing water or wet spots | | |
| 6. Sediment and / or trash accumulation | | |
| 7. Other (specify) | | |
| **6. Condition of Outfalls (Annual , After Major Storms)** | | |
| 1. Riprap failures | | |
| 2. Slope erosion | | |
| 3. Storm drain pipes | | |
| 4.Endwalls / Headwalls | | |
| 5. Other (specify) | | |
| **7. Other ( Monthly)** | | |
| 1. Encroachment on pond, wetland or easement area | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|---|---|---|
| 2. Complaints from residents | | |
| 3.Aesthetics<br>a. Grass growing required | | |
| b. Graffiti removal needed | | |
| c. Other (specify) | | |
| 4. Conditions of maintenance access routes. | | |
| 5. Signs of hydrocarbon build-up | | |
| 6. Any public hazards (specify) | | |
| **8. Wetland Vegetation (Annual)** | | |
| 1. Vegetation healthy and growing<br>Wetland maintaining 50% surface area coverage of wetland plants after the second growing season.<br>(If unsatisfactory, reinforcement plantings needed) | | |
| 2. Dominant wetland plants:<br>Survival of desired wetland plant species<br>Distribution according to landscaping plan? | | |
| 3. Evidence of invasive species | | |
| 4. Maintenance of adequate water depths for desired wetland plant species | | |
| 5. Harvesting of emergent plantings needed | | |
| 6. Have sediment accumulations reduced pool volume significantly or are plants “choked” with sediment | | |
| 7. Eutrophication level of the wetland. | | |
| 8. Other (specify) | | |

**Comments:**

**Actions to be Taken:**

# Infiltration Trench Operation, Maintenance, and Management Inspection Checklist

Project:
Location:
Site Status:

Date:

Time:

Inspector:

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| **1. Debris Cleanout (Monthly)** | | |
| Trench surface clear of debris | | |
| Inflow pipes clear of debris | | |
| Overflow spillway clear of debris | | |
| Inlet area clear of debris | | |
| **2. Sediment Traps or Forebays (Annual)** | | |
| Obviously trapping sediment | | |
| Greater than 50% of storage volume remaining | | |
| **3. Dewatering (Monthly)** | | |
| Trench dewaters between storms | | |
| **4. Sediment Cleanout of Trench (Annual)** | | |
| No evidence of sedimentation in trench | | |
| Sediment accumulation doesn’t yet require cleanout | | |
| **5. Inlets (Annual)** | | |

| MAINTENANCE ITEM | SATISFACTORY / UNSATISFACTORY | COMMENTS |
|---|---|---|
| Good condition | | |
| No evidence of erosion | | |
| **6. Outlet/Overflow Spillway (Annual)** | | |
| Good condition, no need for repair | | |
| No evidence of erosion | | |
| **7. Aggregate Repairs (Annual)** | | |
| Surface of aggregate clean | | |
| Top layer of stone does not need replacement | | |
| Trench does not need rehabilitation | | |

**Comments:**

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

**Actions to be Taken:**

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

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# Infiltration Stormwater Management Practices
# Level 1 Inspection Checklist

| | | | | |
|---|---|---|---|---|
| **SMP ID #** | | **SMP Owner** | | ☐ Private<br>☐ Public |

| | | | | |
|---|---|---|---|---|
| **SMP Location (Address; Latitude & Longitude)** | | | | |
| | **Latitude** | | **Longitude** | |

| | | | |
|---|---|---|---|
| **Party Responsible for Maintenance** | **System Type** | | **Type of Site** |
| ☐ Same as SMP Owner<br>☐ Other<br>____________________ | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State |

| | | | |
|---|---|---|---|
| **Inspection Date** | | **Inspection Time** | |
| **Inspector** | | | |
| **Date of Last Inspection** | | | |

## IN Drainage Area

Look for both pervious and impervious areas that are uphill from the Infiltration cell.

| **Problem (Check if Present)** | | **Follow-Up Actions** |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to get vegetation established.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |

## IN Drainage Area

Look for both pervious and impervious areas that are uphill from the Infiltration cell.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
| ☐ For Dry Wells: Leaves, sticks, or other debris in gutters and downspouts | | ☐ Remove all debris by hand.<br>☐ Other: |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  | ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## IN Inlets

Look for all the places where water flows into the Infiltration practice.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ Inlets are collecting grit and debris or grass/weeds are growing. Some water may not be getting into the Infiltration practice. | ☐ Use a flat shovel to remove grit and debris (especially at curb inlets or openings). Parking lots generate fine grit that will accumulate at these spots.<br>☐ Pull out clumps of growing grass or weeds and scoop out the soil or grit that the plants are growing in.<br>☐ Remove any grass clippings, leaves, sticks, and other debris that is collecting at inlets.<br>☐ For pipes and ditches, remove sediment and debris that is partially blocking the pipe or ditch opening where it enters the Infiltration practice.<br>☐ Dispose of all material properly in an area where it will not re-enter the practice.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Inlets are blocked to the extent that most of the water does not seem to be entering the Infiltration practice. |
| ☐ Some or all of the inlets are eroding so that rills, gullies, and other erosion is present, or there is bare dirt that is washing into the Infiltration practice. | ☐ For small areas of erosion, smooth out the eroded part and apply rock or stone (e.g., river cobble) to prevent further erosion. Usually, filter fabric is placed under the rock or stone.<br>☐ In some cases, reseeding and applying erosion-control matting can be used to prevent further erosion. Some of these materials may be available at a garden center, but it may be best to consult a landscape contractor.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Erosion is occurring at most of the inlets and it looks like there is too much water that is concentrating at these points. The inlet design may have to be modified. |

## IN Infiltration Area

Examine the surface of the infiltration area and the observation well. Note: The following Problem and Follow-Up Actions apply to infiltration practice pretreatment areas also.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ For grass-covered Infiltration practices: grass has grown very tall,<br>*Photo credit: Stormwater Maintenance, LLC* | ☐ Mow infiltration area at least twice per year.<br>☐ Other: |
| <br>☐ For grass-covered Infiltration practices: sparse vegetation cover or bare spots | ☐ Add topsoil (as needed), grass seed, straw, and water during the growing season to re-establish consistent grass coverage.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sparse vegetation cover can be a sign that the infiltration area is not infiltrating at the proper rate and water is standing too long after a storm. The surface may be saturated or squishy, and the conditions do not enable grass to grow. This situation should be evaluated by a Level 2 Inspection and likely corrected by a qualified contractor. |
| ☐ Minor areas of sediment, grit, trash, or other debris are accumulating on the surface. | ☐ Use a shovel to scoop out minor areas of sediment or grit, especially in the spring after winter sanding materials may wash in and accumulate. Dispose of the material where it cannot re-enter the Infiltration practice.<br>☐ If removing the material creates a hole or low area, rake the surface smooth and level.<br>☐ Remove trash, debris, and other undesirable materials.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Sediment has accumulated more than 2-inches deep and covers 25% or more of the surface of the Infiltration area. |

## IN Infiltration Area

Examine the surface of the infiltration area and the observation well. Note: The following Problem and Follow-Up Actions apply to infiltration practice pretreatment areas also.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ There is erosion on the surface; water seems to be carving out rills as it flows across the surface of the Infiltration area or sinkholes are forming in certain areas. | ☐ For minor areas of erosion, try filling the eroded areas with clean topsoil, sand, or stone (whatever the existing cover is).<br>☐ If the problem recurs, you may have to use larger stone (e.g., river cobble) to fill in problem areas.<br>☐ Other:<br><br>☐ Kick-Out to Level 2 Inspection: The problem persists or the erosion is more than 3-inches deep and seems to be an issue with how water enters and moves through the infiltration area.<br>☐ Kick-Out to Level 2 Inspection: The problem does not seem to be caused by flowing water but a collapse or sinking of the surface (e.g., "sinkhole") due to some underground problem. |
| <br>☐ Observation well is damaged or cap is missing | ☐ Kick-Out to Level 2 Inspection: Requires replacing pipes or caps. |

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## IN Infiltration Area

Examine the surface of the infiltration area and the observation well. Note: The following Problem and Follow-Up Actions apply to infiltration practice pretreatment areas also.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
|  ☐ Water still visible in the observation well more than 72 hours after a rain storm. The Infiltration practice does not appear to be draining properly. | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

## IN Outlets

Locate and inspect all outlets.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
|  ☐ Outlet obstructed with sediment, debris, trash, etc. | ☐ Remove the debris and dispose of it where it cannot re-enter the infiltration area.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Outlet is completely obstructed; there is too much material to remove by hand or with simple hand tools. |
| ☐ Rills or gullies are forming at outlet. | ☐ For minor rills, fill in with soil, compact, and seed and straw to establish vegetation.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 Inspection: Rills are more than 2" to 3" deep and require more than just hand raking and re-seeding. |

Additional Notes:

Inspector:________________________________________ Date: __________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: ________________________________ Date: __________________

Department of Environmental Conservation

# Infiltration Stormwater Management Practices
# Level 2 Inspection Checklist

| | | | | |
|---|---|---|---|---|
| **SMP ID #** | | **SMP Owner** | | ☐ Private<br>☐ Public |
| **SMP Location (Address; Latitude & Longitude)** | | | | |
| | **Latitude** | | **Longitude** | |

| **Party Responsible for Maintenance** | **System Type** | | **Type of Site** |
|---|---|---|---|
| ☐ Same as SMP Owner<br>☐ Other<br>____________________ | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State |

| | | | |
|---|---|---|---|
| **Inspection Date** | | **Inspection Time** | |
| **Inspector** | | | |
| **Date of Last Inspection** | | | |

## Level 2 Inspection: INFILTRATION

| Recommended Repairs | Triggers for Level 3 Inspection |
|---|---|
| ***Observed Condition: Water Stands on Surface for More than 72 Hours after Storm*** | |
| ☐ Condition 1: Small pockets of standing water<br><br>For infiltration basins with soil, use a soil probe or auger to examine the soil profile. For gravel infiltration trenches or basins, use a shovel to dig into the gravel layer where the problem is occurring. If isolated areas have accumulated grit, fine silt, or vegetative debris or have bad soil or clogged gravel, try removing and replacing with clean material. If the practice is supposed to have grass cover, it will likely be necessary to replant once the problem is resolved.<br><br>☐ Condition 2: Standing water is widespread or covers entire surface<br><br>Look in the observation well (if it exists) and use a tape measure to estimate the depth of water standing in the soil or gravel. Requires diagnosis and resolution of problem:<br>• Too much sediment/grit washing in from drainage area?<br>• Too much ponding depth?<br>• Improper infiltration media?<br>• Underlying soil not suitable for infiltration?<br>As above, the resolution will likely require replanting and re-establishment of good grass cover if this is part of the design. | • Infiltration media is clogged and problem cannot be diagnosed from Level 2 inspection.<br>• Level 2 inspection identifies problem, but it cannot be resolved easily or it is associated with the original design of the practice.<br><br>☐ Level 3 Inspection necessary |
| ***Observed Condition: Severe erosion of infiltration bed, inlets, or around outlets*** | |
| ☐ Condition 1: Erosion at inlets<br><br>The lining (e.g., grass, matting, stone, rock) may not be adequate for the actual flow velocities coming through the inlets. First line of defense is to try a less erosive lining and/or extending the lining further down to where inlet slopes meet the infiltration surface. If problem persists, analysis by a Qualified Professional is warranted.<br><br>☐ Condition 2: Erosion of infiltration bed<br><br>This is often caused by “preferential flow paths” along the surface. The source of flow should be analyzed and methods employed to dissipate energy and disperse the flow (e.g., check dams, rock splash pads). | • Erosion (rills, gullies) is more than 12 inches deep<br>• The issue is not caused by moving water but some sort of subsurface defect, which may manifest as a sinkhole or linear depression and be associated with problems with the underlying stone or soil.<br><br>☐ Level 3 Inspection necessary |

Notes:

Inspector:________________________________________ Date: __________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: ________________________________ Date: __________________

# Permeable Pavement Stormwater Management Practices Level 1 Inspection Checklist

| | | | | |
|---|---|---|---|---|
| **SMP ID #** | | **SMP Owner** | | ☐ Private<br>☐ Public |

| | | | | |
|---|---|---|---|---|
| **SMP Location (Address; Latitude & Longitude)** | | | | |
| | **Latitude** | | **Longitude** | |

| **Party Responsible for Maintenance** | **System Type** | | **Type of Site** |
|---|---|---|---|
| ☐ Same as SMP Owner<br>☐ Other<br>______________________ | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State |

| | | | |
|---|---|---|---|
| **Inspection Date** | | **Inspection Time** | |
| **Inspector** | | | |
| **Date of Last Inspection** | | | |

## PP Drainage Area

Look for areas that are uphill from the Permeable pavement.

| **Problem (Check if Present)** | | **Follow-Up Actions** |
|---|---|---|
|  | ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in erosion areas with soil, compact, and seed and straw to establish vegetation.<br>☐ If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ Other: |

## PP Drainage Area

Look for areas that are uphill from the Permeable pavement.

| **Problem (Check if Present)** | | **Follow-Up Actions** |
|---|---|---|
|   | | ☐ Kick-Out to Level 2 Inspection: Large areas of soil have been eroded, or larger channels are forming. May require rerouting of flow paths. |
|  | ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Other: |
|  | ☐ Open containers of oil, grease, paint, or other substances | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## PP Surface

Examine the entire permeable pavement surface.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Dirt and grit accumulating on pavement surface | ☐ For small areas (e.g., driveways, patios), try a leaf blower or sweep the area to remove the dirt/grit from the Permeable pavement and properly dispose of the material.<br>☐ If dirt/grit remain in the joint areas between paver blocks, agitate with a rough brush and vacuum the surface with a wet/dry vac.<br>☐ Remove and replace clogged blocks in segmented pavers.<br>☐ For larger areas (e.g., parking lots, courtyards), hire a vacuum sweeper to restore the surface to a cleaner condition.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Grit is widespread and cannot be removed by manual sweeping. |
|  | ☐ Grass and weeds are growing on the permeable pavement surface (applies only to pavement types that are not intended to be covered in vegetation). | ☐ If paver type is not intended to be covered in vegetation, remove the grass/weeds either mechanically (pulling, by hand or with a flame weeder) or with a herbicide approved for use in or near water (consult your local Extension Office for suggestions).<br>☐ Follow the actions listed above for removing dirt/grit from the pavement surface.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Grass/weeds cover more than 25% of surface area. |
|  | ☐ Slumping, sinking, cracking, or breaking of the pavement surface<br>*(Source: CSN, 2013)* | ☐ For small areas (e.g., patios, small driveway), it may be possible to remove the damaged pavers, check and fill in the underlying gravel, and replace with new materials.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Problem affects more than a small, isolated area. Will typically require a qualified contractor to fix it.<br>☐ Problem recurs or occurs in multiple small locations. |
|  | ☐ Water stands on Permeable pavement for days after a rainstorm; the Permeable pavement is clogged and doesn't let water through.<br>*(Source: CSN, 2013)* | ☐ Kick-Out to Level 2 Inspection: This is generally a serious problem, and it will be necessary to activate a Level 2 Inspection. |

Additional Notes:

Inspector:________________________________________ Date: ___________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on ______________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _________________________________ Date: ___________________

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# Permeable Pavement Stormwater Management Practices
# Level 2 Inspection Checklist

| | | | | |
|---|---|---|---|---|
| **SMP ID #** | | **SMP Owner** | | ☐ Private<br>☐ Public |
| **SMP Location (Address; Latitude & Longitude)** | | | | |
| | **Latitude** | | **Longitude** | |
| **Party Responsible for Maintenance** | **System Type** | | | **Type of Site** |
| ☐ Same as SMP Owner<br>☐ Other<br>________________ | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State |
| **Inspection Date** | | **Inspection Time** | | |
| **Inspector** | | | | |
| **Date of Last Inspection** | | | | |

| Level 2 Inspection: PERMEABLE PAVEMENT | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Bare Soil or Erosion in the Drainage Area*** | |
| ☐ Condition 1: Extensive problem spots, but no channels or rills forming<br><br>Reseed problem areas. If problem persists or grass does not take, consider hiring a landscape contractor.<br><br>☐ Condition 2: Problem is extensive, and rills/channels are beginning to form<br><br>May be necessary to divert or redirect water that is causing the erosion problem. If it appears that simple regrading—such as installing a berm or leveling a low spot–will fix the problem, make repairs and check to ensure that the problem is repaired after the next storm. | • Large rills or gullies are forming in the drainage area.<br>• An attempt to regrade the drainage area has been unsuccessful<br>• Fixing the problem would require major regrading (i.e., redirecting more than a 100-square-foot area.<br>• It is not clear why the problem is occurring.<br><br>☐ Level 3 inspection necessary |
| ***Observed Condition: Dirt or Grit Accumulating, or Grass Growing on Pavement Surface*** | |
| ☐ Condition 1: Grit beginning to form but is isolated to a small area or does not fill the joints between paver blocks<br><br>Try to agitate and sweep by hand, or hire a contractor with a vacuum sweeper. Also investigate the drainage area for potential sediment sources. If no obvious sources are found, discuss winter sanding and salting operations with the property owner to identify whether this could be the source.<br><br>☐ Condition 2: Grit is forming and cannot be removed with agitation and hand sweeping<br><br>Hire a vendor with a regenerative air vacuum sweeper, maximum power 2,500 rpm; avoid sweepers that use water. | • More than 2 inches of sand/dirt/grit are on some of the pavement surface.<br>• More than 25% of the pavement surface is covered with sand/dirt/grit to the extent that joints between paver blocks are filled.<br>• Regenerative air sweeper cannot remove grit.<br><br>☐ Level 3 inspection necessary |

| Level 2 Inspection: PERMEABLE PAVEMENT | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Structural Damage*** | |
| ☐ Condition 1: Portions of porous asphalt or permeable pavers are damaged, and the cause is known to be at the surface.<br><br>If the damage is from a single event such as heavy equipment or heavy fallen objects, or the surface has been damaged by wear over time, hire a contractor experienced in permeable pavement installation to repair the damaged areas.<br><br>☐ Condition 2: Damage to other structures, such as drainage infrastructure<br><br>If possible, repair or replace damaged items, or hire a contractor with permeable pavement experience if the damaged infrastructure is within the pavement surface. | • More than 25% of the surface needs to be repaired or replaced.<br>• It appears that the underlying material has "caved in," indicating an underlying water conveyance or soil stabilization issue.<br>• Problem is repaired but recurs within less than five years.<br><br>☐ Level 3 inspection necessary |
| ***Observed Condition: Ponding on the Pavement Surface*** | |
| ☐ Condition 1: Underdrains (if present) may be clogged<br><br>Check to see whether underdrains are clogged by inspecting cleanouts (if present) or catch basins and looking for debris. If underdrains appear clogged, it may be necessary to hire a router service to ream out the underdrains.<br><br>☐ Condition 2: At time of Level 2 inspection, water is not ponded, and there is no obvious clogging of the surface.<br><br>Conduct a flood test to determine whether the ponding is an ongoing problem. | • Water stands on the pavement surface more than 72 hours after a storm, and the problem cannot be resolved by unclogging underdrains.<br>• More than 25% of the pavement surface is covered with sand/dirt/grit to the extent that joints between paver blocks are filled.<br><br>☐ Level 3 inspection necessary |

Notes:

Inspector:_______________________________________ Date: __________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _______________________________ Date: __________________

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# Pond and Wetland Stormwater Management Practices Level 1 Inspection Checklist

| | | | | |
|---|---|---|---|---|
| **SMP ID #** | | **SMP Owner** | | ☐ Private<br>☐ Public |
| **SMP Location (Address; Latitude & Longitude)** | | | | |
| | **Latitude** | | **Longitude** | |

| **Party Responsible for Maintenance** | **System Type** | | **Type of Site** |
|---|---|---|---|
| ☐ Same as SMP Owner<br>☐ Other<br>________________ | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State |

| | | | |
|---|---|---|---|
| **Inspection Date** | | **Inspection Time** | |
| **Inspector** | | | |
| **Date of Last Inspection** | | | |

## PW Drainage Area

Look for areas that are uphill from the pond.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Seed and straw areas of bare soil to establish vegetation.<br>☐ Fill in eroded areas with soil, compact, seed and mulch with straw to establish vegetation.<br>☐ Other: |

| | |
|---|---|
| ☐ Bare soil, erosion of the ground (rills washing out the dirt) | ☐ Kick-Out to Level 2 Inspection: If a rill or small channel is forming, try to redirect water flowing to this area by creating a small berm or adding topsoil to areas that are heavily compacted.<br>☐ If large areas of soil have been eroded or larger channels are forming, this may require rerouting of flow paths or use of an erosion-control seed mat or blanket to reestablish acceptable ground cover or anchor sod where it is practical. |
|  ☐ Piles of grass clippings, mulch, dirt, salt, or other materials | ☐ Remove or cover piles of grass clippings, mulch, dirt, etc.<br>☐ Remove excessive vegetation or woody debris that can block drainage systems.<br>☐ Other: |
|  ☐ Open containers of oil, grease, paint, or other substances exposed to rain in the drainage area | ☐ Cover or properly dispose of materials; consult your local solid waste authority for guidance on materials that may be toxic or hazardous.<br>☐ Other: |

## Pond Inlets

Look for all areas where water flows into the pond during storms. Note that there may be multiple points of inflow and types of structures (e.g., pipes, open ditches, etc.).

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
|  ☐ Inlets are buried, covered or filled with silt, debris, or trash, or blocked by excessive vegetation. | ☐ If the problem can be remedied with hand tools and done in a safe manner, remove vegetation, trash, woody debris, etc. from blocking inlet structures.<br>☐ Other: |
| | ☐ Kick-Out to Level 2 or 3 Inspection: If the amount of material is too large to handle OR there are ANY safety concerns about working in standing water, soft sediment, etc., the work will likely have to be performed by a qualified contractor. |

## Pond Inlets

Look for all areas where water flows into the pond during storms. Note that there may be multiple points of inflow and types of structures (e.g., pipes, open ditches, etc.).

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ Inlets are buried, covered or filled with silt, debris, or trash, or blocked by excessive vegetation. | ☐ Kick-Out to Level 2 or 3 Inspection: If the amount of material is too large to handle OR there are ANY safety concerns about working in standing water, soft sediment, etc., the work will likely have to be performed by a qualified contractor. |
|  | ☐ Inlets are broken, and, with pieces of pipe or concrete falling into the pond, there is erosion around the inlet, there is open space under the pipe, or there is erosion where the inlet meets the pond | ☐ Kick-Out to Level 2 Inspection: These types of structural or erosion problems are more serious and will require a qualified contractor to repair. |

## PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ The pretreatment area(s) or forebay(s) are filled with sediment, trash, vegetation, or other debris. | ☐ If the problem can be remedied with hand tools and done in a safe manner, use a flat shovel or other equipment to remove small amounts of sediment.<br>☐ Remove trash and excessive vegetation from forebays if this can be done in a safe manner.<br>☐ Other: |

## PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ The pretreatment area(s) or forebay(s) are filled with sediment, trash, vegetation, or other debris. | ☐ Kick-Out to Level 2 Inspection: Large amounts of sediment or debris will have to be removed by a qualified contractor. ANY condition that poses a safety concern for working in standing water or soft sediments should be referred to a Level 2 Inspection or qualified contractor. |
|  | ☐ The pond area itself has accumulated sediment, trash, debris, or excessive vegetation that is choking the flow of the water, OR the pond area is covered with algae or aquatic plants. | ☐ Level 1 includes handling only small amounts of material that can be removed by hand, or with rakes or other hand tools. Do not attempt any repair that poses a safety issue.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Most cases will call for a Level 2 Inspection and/or a qualified contractor.<br>☐ You are not sure what type and amount of vegetation is supposed to be in the pond.<br>☐ The algae or aquatic plants should be identified so that proper control techniques can be applied. |
|  | ☐ The side slopes of the pond are unstable, eroding, and have areas of bare dirt. | ☐ If there are only minor areas, try filling in small rills or gullies with topsoil, compacting, and seeding and mulching all bare dirt areas with an appropriate seed. Alternatively, try using herbaceous plugs to get vegetation established in tricky areas, such as steep slopes.<br>☐ Other:<br>☐ Kick-Out to Level 2 Inspection: Erosion and many bare dirt areas on steep side slopes will require a Level 2 Inspection and repair by a qualified contractor. |

## PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
| <br> | ☐ The riser structure is clogged with trash, debris, sediment, vegetation, etc., OR is open, unlocked, or has a steep drop and poses a safety concern. The pond level may have dropped below its "normal" level. | ☐ If you can safely access the riser on foot or with a small boat, clear minor amounts of debris and remove it from the pond area for safe disposal.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: The riser cannot be accessed safely, the amount of debris is substantial, or the riser seems to be completely clogged and the water level has risen too high.<br>☐ There are safety issues with the riser and concern about access to pipes, drops, or any other life safety concern.<br>☐ The riser is leaning, broken, settling or slumping, corroded, eroded or any other structural problem. |
|  | ☐ The dam/embankment is slumping, sinking, settling, eroding, or has medium or large trees growing on it. | ☐ If there are small isolated areas, try to fix them by adding clean material (clay and topsoil) and seeding and mulching.<br>☐ Periodically mow embankments to enable inspection of the banks and to minimize establishment of woody vegetation.<br>☐ Remove any woody vegetation that has already established on embankments.<br>☐ Other: |
| | | ☐ Kick-Out to Level 2 Inspection: Most of these situations will require a Level 2 Inspection or evaluation and repair by a qualified contractor. Seepage through the dam or problems with the pipe through the dam can be a serious issue that should be addressed to avoid possible dam failure. |

## PW Pond Area and Embankments

Examine both interior and exterior pond banks as well as the pond body. Observe from the inlet pipes to the outfall structure and emergency overflow.

| Problem (Check if Present) | | Follow-Up Actions |
|---|---|---|
|  | ☐ The emergency spillway or outfall (if it exists) has<br><br>☐ Erosion, settlement, or loss of material. Rock-lined spillways have excessive debris or vegetation. | ☐ Clear light debris and vegetation.<br>☐ Other:<br><br>☐ Kick-Out to Level 2 Inspection: Displacement of rock lining, excessive vegetation and erosion/settlement may warrant review and decision by Level 2 Inspector to check against original plan.<br>☐ Any uncertainty about the integrity of the emergency spillway should be referred to a Level 2 Inspector.<br>☐ Erosion or settlement such that design has been compromised should be reviewed by an engineer. |

## PW Pond Outlet

Examine the outlet of the pipe on the downstream side of the dam/embankment where it empties into a stream, channel, or drainage system.

| Problem (Check if Present) | Follow-Up Actions |
|---|---|
| <br>☐ The pond outlet is clogged with sediment, trash, debris, vegetation, or is eroding, caving in, slumping, or falling apart. | ☐ If there is a minor blockage, remove the debris or vegetation to allow free flow of water.<br>☐ Remove any accumulated trash at the outlet.<br>☐ Outlet:<br><br>☐ Kick-Out to Level 2 Inspection:<br>☐ If the area at the outlet cannot be easily accessed or if the blockage is substantial, a Level 2 Inspection is warranted.<br>☐ Erosion at and downstream of the outfall should be evaluated by a qualified professional.<br>☐ Any structural problems, such as broken pipes, structures falling into the stream, or holes or tunnels around the outfall pipe, should be evaluated by a Level 2 Inspector and will require repair by a qualified contractor.<br>☐ The pool of water at the outlet pipe is discolored, has an odor, or has excessive algae or vegetative growth. |

Additional Notes:

|  |
| --- |
|  |

Inspector:_________________________________________ Date: ___________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on ______________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _________________________________ Date: ____________________

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

# Pond and Wetland Stormwater Management Practices Level 2 Inspection Checklist

| | | | | | | |
|---|---|---|---|---|---|---|
| **SMP ID #** | | | **SMP Owner** | | | ☐ Private<br>☐ Public |
| **SMP Location (Address; Latitude & Longitude)** | | | | | | |
| | **Latitude** | | | **Longitude** | | |
| **Party Responsible for Maintenance** | | **System Type** | | | **Type of Site** | |
| ☐ Same as SMP Owner<br>☐ Other<br>________________ | | ☐ Seasonal<br>☐ Continuous Use<br>☐ Other | ☐ Above Ground<br>☐ Below Ground | | ☐ Commercial<br>☐ Industrial<br>☐ Residential<br>☐ State | |
| **Inspection Date** | | | **Inspection Time** | | | |
| **Inspector** | | | | | | |
| **Date of Last Inspection** | | | | | | |

| Level 2 Inspection: PONDS and WETLANDS | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Bare Soil or Erosion in the Drainage Area*** | |
| ☐ Condition 1: Extensive problem spots, but no channels or rills forming<br><br>Reseed problem areas. If problem persists or grass does not take, consider hiring a landscape contractor.<br><br>☐ Condition 2: Problem is extensive, and rills/channels are beginning to form<br><br>May be necessary to divert or redirect water that is causing the erosion problem. If it appears that simple regrading—such as installing a berm or leveling a low spot–will fix the problem, make repairs and ensure that the problem is repaired after the next storm. | • Large rills or gullies are forming in the drainage area.<br>• An attempt to regrade the drainage area has been unsuccessful.<br>• Fixing the problem would require major regrading (i.e., redirecting more than a 100-square-foot area.<br>• It is not clear why the problem is occurring.<br><br>☐ Level 3 inspection necessary |
| ***Observed Condition: Manholes or Inlet Pipe Buried or Covered with Vegetation*** | |
| ☐ Condition 1: Nearest manhole and inlet pipe not found<br><br>Consult as-built drawings to get to closest suspected location and use metal detector to search for metal manhole cover. If unsuccessful, identify nearest drain inlets and approximate pipe direction to locate next manhole.<br><br>☐ Condition 2: Manhole located and inspected<br><br>Never enter a manhole, except by following confined-space entry protocols.<br><br>If outlet pipe is not visible or greater than 25% full of sediment/debris or trash, it will typically require a qualified contractor to flush, clean and clear blockages.<br><br>☐ Condition 3: Inlet pipe not found at pond<br><br>Clear vegetation and brush that may be covering the inlet pipe. Buried inlet pipes may be found through use of a metal probe.<br><br>☐ Condition 4: Inlet pipe buried in sediment or blocked by vegetation<br><br>Once located, the pipe path can be cleared of vegetation with brush hook or other brush tools. Light digging may clear sediment from the end of the pipe. | • To locate buried manholes and lost storm lines, it is sometimes necessary to hire a pipeline inspection contractor with televising equipment or ground-penetrating radar and enter at the closest upstream access point.<br>• Locating a buried inlet pipe may require wading in the edge of the pond and using a metal probe and brush axe to find and expose the pipe.<br>• If other than light digging is necessary to remove accumulated sediment, a contractor with heavy equipment may be required.<br><br>☐ Level 3 inspection necessary |

| Level 2 Inspection: PONDS and WETLANDS | |
|---|---|
| **Recommended Repairs and Required Skills** | **Triggers for Level 3 Inspection** |
| ***Observed Condition: Pipe or Headwall Settlement, Erosion, Corrosion or Failure*** | |
| ☐ Condition 1: Pipe or headwall settlement or failure<br><br>Severe sinkholes, settlement or corrosion should be kicked out to Level 3 Inspection.<br><br>☐ Condition 2: Flow not confined to pipe and visible outside pipe wall<br><br>With flashlight, observe the inside of the pipe and note its condition. Take photographs. Look for sinkholes developing that indicate pipe failure beneath the surface. Kick out to Level 3 inspection. | • Where blockages are visible, a decision is needed on whether to clear them or leave in place. If a third of the pipe is full of sediment, it should be removed by a contractor with pipe-cleaning equipment.<br>• Corrosion of inlet pipes that allows flow around the pipe exterior is a structural concern because it can lead to settlement, sinkholes and undermining pond embankment. Evidence of this type of failure may require specialized pipe-inspection equipment and investigation by an engineer.<br><br>☐ Level 3 inspection necessary |
| ***Observed Condition: Pond Conditions*** | |
| ☐ Condition 1: Pond pre-treatment zone is full of sediment or not constructed as shown on as-built drawings.<br><br>☐ Condition 2: Excessive buildup of sediment or overgrowth<br><br>If the pre-treatment area or pond pool is overgrown or filled with sediment so that the original design is compromised, corrective measures are required. If plants have died, then replanting is necessary. If none of the original design exists due to alteration or sediment, kick out to Level 3 inspection. | • It may require inspection by an engineer to determine next steps for clearing, replanting or reconstruction.<br>• Erosion or settlement such that design has been compromised should be reviewed by an engineer. Recurring erosion may require redesign and/or regrading to direct flow away from eroding area.<br>• If sediment has filled more than 50% of the pond's capacity, dredging is likely needed and should be evaluated by a qualified contractor.<br>• Removal or control of excessive algae or aquatic plants can be assessed by a qualified pond maintenance company.<br><br>☐ Level 3 inspection necessary |

Notes:

Inspector:________________________________________ Date: __________________

Complete the following if follow-up/corrective actions were identified during this inspection:

**Certified Completion of Follow-Up Actions:**

"I hereby certify that the follow-up/corrective actions identified in the inspection performed on _____________ (DATE) have been completed and any required maintenance deficiencies have been adequately corrected."

Inspector/Operator: _______________________________ Date: __________________

# Appendix C – Maintenance Agreements

# Appendix D – Blank Maintenance Inspection Form

## Post-Construction Operation and Maintenance Manual: Maintenance Inspection Form

| | |
|---|---|
| **Project Name:** | |
| **Inspection Date:** | |
| **Inspection Time:** | |
| **Inspector's Name:** | |

| Inspection Item | Inspection Frequency | Maintenance Required? | Comments |
|---|---|---|---|
| **Swale(s)** | | | |
| Free of trash, debris, and pollutants? | Monthly | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Spillway is stable and is free of erosion or sedimentation? | Annually | | |
| Channel dewaters between storm events? | Monthly | | |
| Blockage of flow present in the swale, culverts or underdrains? | Monthly | | |
| Vegetation is healthy and sufficient ground cover is observed? | Monthly | | |
| Vegetation is mowed to a minimum height of 8 inches? | Monthly | | |
| **Riparian Buffers and Filter Strips** | | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 4 inches (minimum of 4 cuttings per year)? | Quarterly | | |
| Buffer length has not been reduced? | Annually | | |
| **Flow Spreaders/Level Spreaders** | | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Channelization around the weir is observed? | Annually | | |
| Rock outlet protection is displaced? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 8 inches? | Annually | | |
| **Detention Ponds** | | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Erosion and sedimentation not observed? | Annually | | |
| Stormwater control structure is free of sediment, debris/trash, and no damage was observed? | Annually | | |

| Inspection Item | Inspection Frequency | Maintenance Required? | Comments |
|---|---|---|---|
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 8 inches? | Annually | | |
| Sediment has reached 50% of the forebay capacity? | Annually | | |
| Security features around the pond are in good condition? | Annually | | |
| **Infiltration Facilities** | | | |
| Facility is functioning properly? | Annually | | |
| Free of trash, debris, and pollutants? | Monthly | | |
| System is draining properly? | Monthly | | |
| Sediment accumulation has reached 2 inches or greater? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 8 inches? | Annually | | |
| Overflow area is in good condition? | Annually | | |
| **Storm Culverts and Drainage Pipes** | | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Culvert/pipe is free of obstructions and functioning properly? | Annually | | |
| Vegetation at the inlet and outlet is properly maintained? | Annually | | |
| Culvert/pipe is not damaged (cracked, warped, corroded, etc.)? | Annually | | |
| 25% or more of the culvert/pipe structure has been compromised? | Annually | | |
| **End Sections** | | | |
| Free of trash, debris, and pollutants? | Semi-Annually | | |
| Erosion and/or sedimentation is observed? | Semi-Annually | | |
| Rocks at the outlet have not been displaced or are insufficient? | Semi-Annually | | |
| Vegetation is impeding the flow of stormwater from the structure? | Semi-Annually | | |
| **Fences, Gates, and Signage** | | | |
| Fencing and gates are in working order and are not damaged? | Annually | | |
| Signage is legible and displayed clearly? | Annually | | |
| Vegetation is maintained to not impede gated access or block signage? | Annually | | |
| **Access Roads** | | | |
| Road surface is free of riling? | Annually | | |

| Inspection Item | Inspection Frequency | Maintenance Required? | Comments |
|---|---|---|---|
| Geo-web/grid is not exposed? | Annually | | |
| Gravel cover is sufficient, and the road has maintained the proper grade? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 4 inches? | Annually | | |
| **Pervious Access Roads** | | | |
| Road surface is free of riling? | Annually | | |
| Geo-web/grid is not exposed? | Annually | | |
| Gravel cover is sufficient, and the road has maintained the proper grade? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 4 inches? | Annually | | |
| **Gravel Parking Areas** | | | |
| Road surface is free of riling? | Annually | | |
| Geo-web/grid is not exposed? | Annually | | |
| Gravel cover is sufficient, and the road has maintained the proper grade? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 4 inches? | Annually | | |
| **Gravel Substation Yard** | | | |
| Surface is free of riling? | Annually | | |
| Gravel cover is sufficient, and has maintained the proper grade? | Annually | | |
| Erosion and/or sedimentation observed? | Annually | | |
| Free of trash, debris, and pollutants? | Annually | | |
| Vegetation is healthy and sufficient ground cover is observed? | Annually | | |
| Vegetation is mowed to a minimum height of 4 inches? | Annually | | |

# Appendix E – Completed Maintenance Inspection Forms

# Appendix J – Stormwater Design Calculations

- Water Quality Volume (WQv) and Runoff Reduction Volume (RRv) Calculations -

- Culvert Sizing Calculation -

- NYSDEC Solar Panel Construction Stormwater Permitting/SWPPP Guidance -

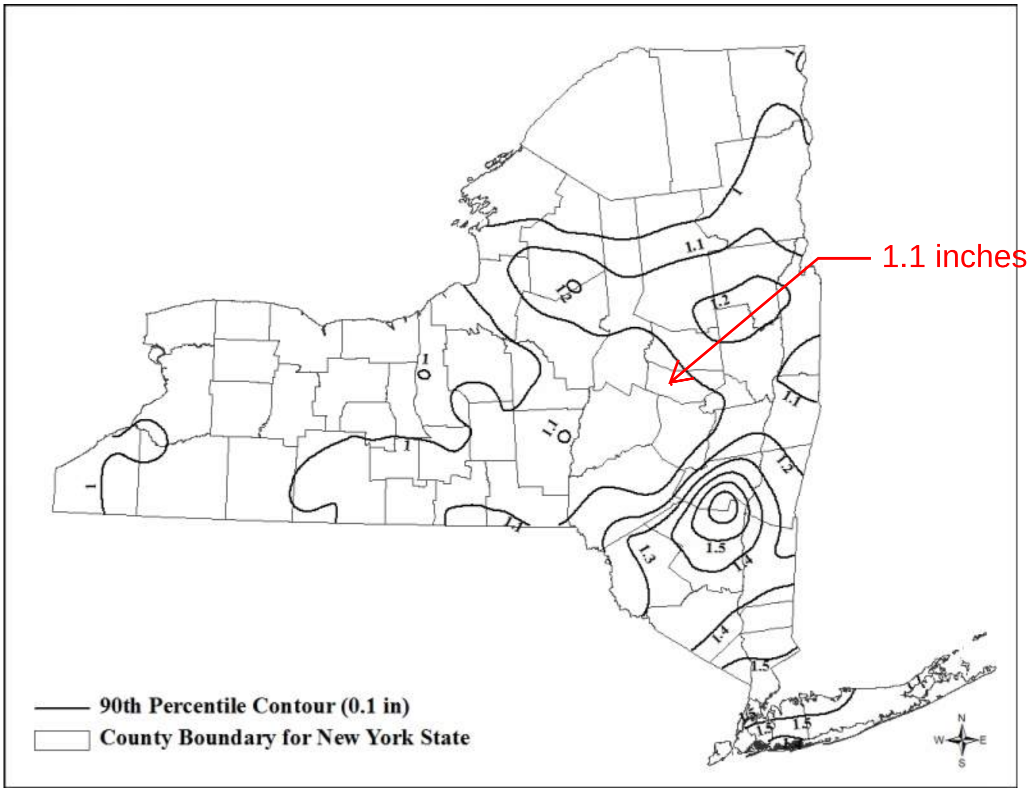
- Maryland Department of the Environment (MDEP) Stormwater Design Guidance – Solar Panel Installation -

- NYSDEC Limited-Use Pervious Access Road Approval -

Note: Documents provided in this Appendix are preliminary and will be amended and finalized for the Final SWPPP prior to construction.

# Appendix J – Water Quality Volume (WQv) and Runoff Reduction Volume (RRv) Calculations

**Figure 4.1: 90th Percentile Rainfall in New York State (NYSDEC, 2013)**




### Basis of Design for Water Quality

As a basis for design, the following assumptions may be made:

*Measuring Impervious Cover*: the measured area of a site plan that does not have permanent vegetative or permeable cover shall be considered total impervious cover. Impervious cover is defined as all impermeable surfaces and includes: paved and gravel road surfaces, paved and gravel parking lots, paved driveways, building structures, paved sidewalks, and miscellaneous impermeable structures such as patios, pools, and sheds. Where site size makes direct measurement of impervious cover impractical, the land use/impervious cover relationships presented in Table 4.2 can be used to initially estimate impervious cover. In site specific planning impervious cover must be calculated based the specific proposed impervious cover.

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/2024 |
| Proj. No.: | 435979 | Checked By: | PGT |
| | Time of Concentration Summary | Revised: | |

## Time of Concentration Equations:

1. Where $T_t := \frac{0.007 \cdot (N \cdot L)^{0.8}}{P_2^{0.5} \cdot S^{0.4}}$ from SCS TR-55. For Sheet Flow (300 feet or less)

2. Where $V := 20.3282 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Shallow Concentrated Flow (Paved surfaces)

3. Where $T_t := \frac{L}{3600 \cdot V}$ from the SCS Upland Method *Channel Flow Chart* Travel time equation

4. Where $V := 16.1345 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Shallow Concentrated Flow (Unpaved surfaces)

5. Where: $v = 9\sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Shallow Concentrated Flow (Cultivated)

6. Where: $v = 7\sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Shallow Concentrated Flow (Short Grass Pasture)

7. Where: $v = 5\sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Shallow Concentrated Flow (Woodland)

8. Where $V := 12 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Channel Flow - Waterways and Swamps, No Channels

9. Where $V := 15 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Channel Flow - Grassed Waterways and Roadside Ditches

10. Where $V := 21 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Channel Flow - Small Tributary & Swamp w/Channels

11. Where $V := 35 \cdot \sqrt{S}$ from the SCS Upland Method *Channel Flow Chart* For Channel Flow - Large Tributary

13. Where $V := \frac{1.49 \cdot R^{.667} \cdot \sqrt{S}}{N}$ For Channel Flow - Culvert Flow

14. Where $P_2$ = 2-Year, 24 Hour Rainfall (in) (Montgomery County, NY: $P_2$= 2.39 inches)

## Mannings Roughness Coefficients Table

| Surface Description | n - value |
|---|---|
| Smooth surfaces | 0.011 |
| Crush Stone/Substation Yards | 0.025 |
| Fallow | 0.050 |
| Cultivated: Residue<=20% | 0.060 |
| Cultivated: Residue>=20% | 0.170 |
| Grass: Short | 0.150 |
| Grass: Dense | 0.240 |
| Grass: Bermuda | 0.410 |
| Range | 0.130 |
| Woods: Light underbrush | 0.400 |
| Woods: Dense underbrush | 0.800 |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **1S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | | | |
| $T_t$[1], hr | 0.445 | | | | | | | | | | 0.4455 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 784 | | | | | | | | | |
| Slope, ft/ft | | 0.014 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | | | | | | | | |
| $T_t$[3], hr | | 0.263 | | | | | | | | | 0.2629 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 2388 | | | | | | | | |
| Slope, ft/ft | | | 0.04 | | | | | | | | |
| Velocity[8], ft/sec | | | 4.200 | | | | | | | | |
| $T_t$, hr | | | 0.158 | | | | | | | | 0.1579 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.866 |
| **Min** | **51.98** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **1S - Post** | | | | | | | | **Revised:** | | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | | | |
| $T_t$[1], hr | 0.445 | | | | | | | | | | 0.4455 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 784 | | | | | | | | | |
| Slope, ft/ft | | 0.014 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | | | | | | | | |
| $T_t$[3], hr | | 0.263 | | | | | | | | | 0.2629 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 2388 | | | | | | | | |
| Slope, ft/ft | | | 0.04 | | | | | | | | |
| Velocity[8], ft/sec | | | 4.200 | | | | | | | | |
| $T_t$, hr | | | 0.158 | | | | | | | | 0.1579 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.866 |
| **Min** | **51.98** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **3S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.050 | | | | | | | | | | |
| $T_t$[1], hr | 0.191 | | | | | | | | | | 0.1908 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 241 | 445 | | | | | | | | |
| Slope, ft/ft | | 0.05 | 0.017 | | | | | | | | |
| Velocity[4], ft/sec | | 1.5652 | 0.9127 | | | | | | | | |
| $T_t$[3], hr | | 0.043 | 0.135 | | | | | | | | 0.1782 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 50 | | | | | | | |
| Slope, ft/ft | | | | 0.03 | | | | | | | |
| Velocity[5], ft/sec | | | | 0.8660 | | | | | | | |
| $T_t$[3], hr | | | | 0.016 | | | | | | | 0.0160 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.385 |
| **Min** | **23.10** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **3S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.050 | | | | | | | | | | |
| $T_t$[1], hr | 0.191 | | | | | | | | | | 0.1908 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 241 | 445 | | | | | | | | |
| Slope, ft/ft | | 0.05 | 0.017 | | | | | | | | |
| Velocity[4], ft/sec | | 1.5652 | 0.9127 | | | | | | | | |
| $T_t$[3], hr | | 0.043 | 0.135 | | | | | | | | 0.1782 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 50 | | | | | | | |
| Slope, ft/ft | | | | 0.03 | | | | | | | |
| Velocity[5], ft/sec | | | | 0.8660 | | | | | | | |
| $T_t$[3], hr | | | | 0.016 | | | | | | | 0.0160 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.385 |
| **Min** | **23.10** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **4S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 | Seg 17 | Seg 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | | | | | | | | | | | |
| $T_t^1$, hr | 0.445 | | | | | | | | | | | | | | | | | | 0.4455 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | 277 | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | 0.015 | | | | | | | | | | | | | | | | | |
| Velocity$^4$, ft/sec | | 0.8573 | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | 0.090 | | | | | | | | | | | | | | | | | 0.0897 |
| **Woodland** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^5$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | 778 | | | | | | | | | | | 593 | | | | | |
| Slope, ft/ft | | | 0.024 | | | | | | | | | | | 0.027 | | | | | |
| Velocity$^7$, ft/sec | | | 2.324 | | | | | | | | | | | 2.465 | | | | | |
| $T_t$, hr | | | 0.093 | | | | | | | | | | | 0.067 | | | | | 0.1598 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | 741 | 401 | | 605 | | 627 | | 527 | | | | 2925 | | | |
| Slope, ft/ft | | | | | 0.079 | 0.032 | | 0.042 | | 0.045 | | 0.04 | | | | 0.01 | | | |
| Velocity$^8$, ft/sec | | | | | 5.902 | 3.757 | | 4.304 | | 4.455 | | 4.200 | | | | 2.100 | | | |
| $T_t$, hr | | | | | 0.035 | 0.030 | | 0.039 | | 0.039 | | 0.035 | | | | 0.387 | | | 0.5644 |
| **Large Tributary** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | | | | | | | |
| Diameter, ft | | | | 2 | | | 2 | | 2 | | 2 | | 1 | | 2.5 | | | | |
| Area, ft$^2$ | | | | 3.14 | | | 3.14 | | 3.14 | | 3.14 | | 0.785 | | 4.90625 | | | | |
| Wetted Perimeter, ft | | | | 6.28 | | | 6.28 | | 6.28 | | 6.28 | | 3.14 | | 7.85 | | | | |
| Hydraulic Radius, R, ft | | | | 0.5 | | | 0.5 | | 0.5 | | 0.5 | | 0.25 | | 0.625 | | | | |
| Slope, ft/ft | | | | 0.005 | | | 0.056 | | 0.014 | | 0.075 | | 0.025 | | 0.025 | | | | |
| Manning's No. | | | | 0.025 | | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | | | |
| Velocity$^{11}$, ft/sec | | | | 2.6542648 | | | 8.8828692 | | 4.4414346 | | 10.279924 | | 3.7380254 | | 6.887605 | | | | |
| Length, L, ft | | | | 40 | | | 18 | | 36 | | 40 | | 40 | | 40 | | | | |
| $T_t$, hr | | | | 0.00419 | | | 0.00056 | | 0.00225 | | 0.00108 | | 0.00297 | | 0.00161 | | | | 0.0127 |

| | |
|---|---|
| HR | 1.272 |
| **Min** | **76.33** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **4S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | Seg 11 | Seg 12 | Seg 13 | Seg 14 | Seg 15 | Seg 16 | Seg 17 | Seg 18 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | | | | | | | | | | | |
| $T_t$[1], hr | 0.445 | | | | | | | | | | | | | | | | | | 0.4455 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | 277 | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | 0.015 | | | | | | | | | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8573 | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | 0.090 | | | | | | | | | | | | | | | | | 0.0897 |
| **Woodland** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | 778 | | | | | | | | | | | 593 | | | | | |
| Slope, ft/ft | | | 0.024 | | | | | | | | | | | 0.027 | | | | | |
| Velocity[7], ft/sec | | | 2.324 | | | | | | | | | | | 2.465 | | | | | |
| $T_t$, hr | | | 0.093 | | | | | | | | | | | 0.067 | | | | | 0.1598 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | 741 | 401 | | 605 | | 627 | | 527 | | | | 2925 | | | |
| Slope, ft/ft | | | | | 0.079 | 0.032 | | 0.042 | | 0.045 | | 0.04 | | | | 0.01 | | | |
| Velocity[8], ft/sec | | | | | 5.902 | 3.757 | | 4.304 | | 4.455 | | 4.200 | | | | 2.100 | | | |
| $T_t$, hr | | | | | 0.035 | 0.030 | | 0.039 | | 0.039 | | 0.035 | | | | 0.387 | | | 0.5644 |
| **Large Tributary** | | | | | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | | | | | | | |
| Diameter, ft | | | | 2 | | | 2 | | 2 | | 2 | | 1 | | 2.5 | | | | |
| Area, $ft^2$ | | | | 3.14 | | | 3.14 | | 3.14 | | 3.14 | | 0.785 | | 4.90625 | | | | |
| Wetted Perimeter, ft | | | | 6.28 | | | 6.28 | | 6.28 | | 6.28 | | 3.14 | | 7.85 | | | | |
| Hydraulic Radius, R, ft | | | | 0.5 | | | 0.5 | | 0.5 | | 0.5 | | 0.25 | | 0.625 | | | | |
| Slope, ft/ft | | | | 0.005 | | | 0.056 | | 0.014 | | 0.075 | | 0.025 | | 0.025 | | | | |
| Manning's No. | | | | 0.025 | | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | 0.025 | | | | |
| Velocity[11], ft/sec | | | | 2.6542648 | | | 8.8828692 | | 4.4414346 | | 10.279924 | | 3.7380254 | | 6.887605 | | | | |
| Length, L, ft | | | | 40 | | | 18 | | 36 | | 40 | | 40 | | 40 | | | | |
| $T_t$, hr | | | | 0.00419 | | | 0.00056 | | 0.00225 | | 0.00108 | | 0.00297 | | 0.00161 | | | | 0.0127 |

| | |
|---|---|
| HR | 1.272 |
| **Min** | **76.33** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **5S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.013 | | | | | | | | | | |
| $T_t$[1], hr | 0.327 | | | | | | | | | | 0.3270 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 842 | | | | | | | | | |
| Slope, ft/ft | | 0.024 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.0844 | | | | | | | | | |
| $T_t$[3], hr | | 0.216 | | | | | | | | | 0.2157 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | 311 | 242 | | | | | | | |
| Slope, ft/ft | | | 0.087 | 0.19 | | | | | | | |
| Velocity[7], ft/sec | | | 4.424 | 6.538 | | | | | | | |
| $T_t$, hr | | | 0.020 | 0.010 | | | | | | | 0.0298 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.572 |
| | | | | | | | | | | **Min** | **34.35** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | **Checked By:** | PGT |
| **Subcatchment:** | **5S - POST** | | | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | | | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | |
| Manning's No. | 0.240 | 0.011 | 0.240 | | | | | | | | | | |
| Length, ft | 34 | 23 | 43 | | | | | | | | | | |
| P2 , in | 2.39 | 2.39 | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.003 | 0.009 | 0.023 | | | | | | | | | | |
| $T_t$[1], hr | 0.248 | 0.010 | 0.132 | | | | | | | | | | 0.3904 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | |
| Length, ft | | | | 842 | | | | | | | | | |
| Slope, ft/ft | | | | 0.024 | | | | | | | | | |
| Velocity[4], ft/sec | | | | 1.0844 | | | | | | | | | |
| $T_t$[3], hr | | | | 0.216 | | | | | | | | | 0.2157 |
| **Woodland** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | |
| Length, ft | | | | | 311 | 242 | | | | | | | |
| Slope, ft/ft | | | | | 0.087 | 0.19 | | | | | | | |
| Velocity[7], ft/sec | | | | | 4.424 | 6.538 | | | | | | | |
| $T_t$, hr | | | | | 0.020 | 0.010 | | | | | | | 0.0298 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.636 |
| **Min** | **38.15** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **6S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | | | |
| $T_t$[1], hr | 0.479 | | | | | | | | | | 0.4792 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 256 | 341 | | | | | | | | |
| Slope, ft/ft | | 0.02 | 0.103 | | | | | | | | |
| Velocity[4], ft/sec | | 0.9899 | 2.2466 | | | | | | | | |
| $T_t$[3], hr | | 0.072 | 0.042 | | | | | | | | 0.1140 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 316 | | | | | | | |
| Slope, ft/ft | | | | 0.187 | | | | | | | |
| Velocity[5], ft/sec | | | | 2.1622 | | | | | | | |
| $T_t$[3], hr | | | | 0.041 | | | | | | | 0.0406 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | 137 | | | | | | |
| Slope, ft/ft | | | | | 0.007 | | | | | | |
| Velocity[7], ft/sec | | | | | 1.255 | | | | | | |
| $T_t$, hr | | | | | 0.030 | | | | | | 0.0303 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.664 |
| **Min** | **39.84** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **6S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | | | |
| $T_t$[1], hr | 0.479 | | | | | | | | | | 0.4792 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 256 | 341 | | | | | | | | |
| Slope, ft/ft | | 0.02 | 0.103 | | | | | | | | |
| Velocity[4], ft/sec | | 0.9899 | 2.2466 | | | | | | | | |
| $T_t$[3], hr | | 0.072 | 0.042 | | | | | | | | 0.1140 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 316 | | | | | | | |
| Slope, ft/ft | | | | 0.187 | | | | | | | |
| Velocity[5], ft/sec | | | | 2.1622 | | | | | | | |
| $T_t$[3], hr | | | | 0.041 | | | | | | | 0.0406 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | 137 | | | | | | |
| Slope, ft/ft | | | | | 0.007 | | | | | | |
| Velocity[7], ft/sec | | | | | 1.255 | | | | | | |
| $T_t$, hr | | | | | 0.030 | | | | | | 0.0303 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.664 |
| **Min** | **39.84** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **7S - Pre** | | | | | | | | **Revised:** | | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | | | |
| $T_t$[1], hr | 0.281 | | | | | | | | | | 0.2809 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 449 | 512 | | | | | | | | |
| Slope, ft/ft | | 0.039 | 0.022 | | | | | | | | |
| Velocity[4], ft/sec | | 1.3824 | 1.0383 | | | | | | | | |
| $T_t$[3], hr | | 0.090 | 0.137 | | | | | | | | 0.2272 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 945 | 192 | | 284 | | | | |
| Slope, ft/ft | | | | 0.024 | 0.031 | | 0.053 | | | | |
| Velocity[5], ft/sec | | | | 0.7746 | 0.8803 | | 1.1511 | | | | |
| $T_t$[3], hr | | | | 0.339 | 0.061 | | 0.069 | | | | 0.4680 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | 3312 | | 711 | | | |
| Slope, ft/ft | | | | | | 0.031 | | 0.042 | | | |
| Velocity[8], ft/sec | | | | | | 3.697 | | 4.304 | | | |
| $T_t$, hr | | | | | | 0.249 | | 0.046 | | | 0.2947 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.271 |
| **Min** | **76.25** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **7S - POST** | | | | | | | | **Revised:** | | |

**Time of Concentration Determination Worksheet, SCS Methods**

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | | | |
| $T_t$[1], hr | 0.281 | | | | | | | | | | 0.2809 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 449 | 512 | | | | | | | | |
| Slope, ft/ft | | 0.039 | 0.022 | | | | | | | | |
| Velocity[4], ft/sec | | 1.3824 | 1.0383 | | | | | | | | |
| $T_t$[3], hr | | 0.090 | 0.137 | | | | | | | | 0.2272 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | 945 | 192 | | 284 | | | | |
| Slope, ft/ft | | | | 0.024 | 0.031 | | 0.053 | | | | |
| Velocity[5], ft/sec | | | | 0.7746 | 0.8803 | | 1.1511 | | | | |
| $T_t$[3], hr | | | | 0.339 | 0.061 | | 0.069 | | | | 0.4680 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | 3312 | | 711 | | | |
| Slope, ft/ft | | | | | | 0.031 | | 0.042 | | | |
| Velocity[8], ft/sec | | | | | | 3.697 | | 4.304 | | | |
| $T_t$, hr | | | | | | 0.249 | | 0.046 | | | 0.2947 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 1.271 |
| | | | | | | | | | | **Min** | **76.25** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **8S - Pre** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.042 | | | | | | | | | | |
| $T_t$[1], hr | 0.205 | | | | | | | | | | 0.2045 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 364 | | | | | | | | | |
| Slope, ft/ft | | 0.021 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.0144 | | | | | | | | | |
| $T_t$[3], hr | | 0.100 | | | | | | | | | 0.0997 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | 1017 | 1137 | | | | | | | |
| Slope, ft/ft | | | 0.032 | 0.065 | | | | | | | |
| Velocity[7], ft/sec | | | 2.683 | 3.824 | | | | | | | |
| $T_t$, hr | | | 0.105 | 0.083 | | | | | | | 0.1879 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.492 |
| | | | | | | | | | | **Min** | **29.52** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **8S - POST** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.042 | | | | | | | | | | |
| $T_t$[1], hr | 0.205 | | | | | | | | | | 0.2045 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 364 | | | | | | | | | |
| Slope, ft/ft | | 0.021 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.0144 | | | | | | | | | |
| $T_t$[3], hr | | 0.100 | | | | | | | | | 0.0997 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | 1017 | 1137 | | | | | | | |
| Slope, ft/ft | | | 0.032 | 0.065 | | | | | | | |
| Velocity[7], ft/sec | | | 2.683 | 3.824 | | | | | | | |
| $T_t$, hr | | | 0.105 | 0.083 | | | | | | | 0.1879 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.492 |
| **Min** | **29.52** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **9S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.001 | | | | | | | | | | |
| $T_t$[1], hr | 0.912 | | | | | | | | | | 0.9122 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 540 | | | | | | | | | |
| Slope, ft/ft | | 0.010 | | | | | | | | | |
| Velocity[5], ft/sec | | 0.5000 | | | | | | | | | |
| $T_t$[3], hr | | 0.300 | | | | | | | | | 0.3000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | 572 | | | | | | | | |
| Slope, ft/ft | | | 0.001 | | | | | | | | |
| Velocity[8], ft/sec | | | 1.107 | | | | | | | | |
| $T_t$, hr | | | 0.144 | | | | | | | | 0.1436 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.356 |
| **Min** | **81.34** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **9S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.001 | | | | | | | | | | |
| $T_t$[1], hr | 0.912 | | | | | | | | | | 0.9122 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 540 | | | | | | | | | |
| Slope, ft/ft | | 0.010 | | | | | | | | | |
| Velocity[5], ft/sec | | 0.5000 | | | | | | | | | |
| $T_t$[3], hr | | 0.300 | | | | | | | | | 0.3000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | 572 | | | | | | | | |
| Slope, ft/ft | | | 0.001 | | | | | | | | |
| Velocity[8], ft/sec | | | 1.107 | | | | | | | | |
| $T_t$, hr | | | 0.144 | | | | | | | | 0.1436 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.356 |
| **Min** | **81.34** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **10S - Pre** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.001 | | | | | | | | | | |
| $T_t$[1], hr | 0.912 | | | | | | | | | | 0.9122 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 388 | | 165 | | | | | | | |
| Slope, ft/ft | | 0.003 | | 0.012 | | | | | | | |
| Velocity[4], ft/sec | | 0.3834 | | 0.7668 | | | | | | | |
| $T_t$[3], hr | | 0.281 | | 0.060 | | | | | | | 0.3409 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 33 | | | | | | | | |
| Slope, ft/ft | | | 0.061 | | | | | | | | |
| Velocity[5], ft/sec | | | 1.2349 | | | | | | | | |
| $T_t$[3], hr | | | 0.007 | | | | | | | | 0.0074 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | 310 | 920 | 295 | | | | |
| Slope, ft/ft | | | | | 0.006 | 0.008 | 0.026 | | | | |
| Velocity[8], ft/sec | | | | | 1.627 | 1.878 | 3.386 | | | | |
| $T_t$, hr | | | | | 0.053 | 0.136 | 0.024 | | | | 0.2132 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.474 |
| **Min** | **88.42** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **10S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.001 | | | | | | | | | | |
| $T_t$[1], hr | 0.912 | | | | | | | | | | 0.9122 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 388 | | 165 | | | | | | | |
| Slope, ft/ft | | 0.003 | | 0.012 | | | | | | | |
| Velocity[4], ft/sec | | 0.3834 | | 0.7668 | | | | | | | |
| $T_t$[3], hr | | 0.281 | | 0.060 | | | | | | | 0.3409 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 33 | | | | | | | | |
| Slope, ft/ft | | | 0.061 | | | | | | | | |
| Velocity[5], ft/sec | | | 1.2349 | | | | | | | | |
| $T_t$[3], hr | | | 0.007 | | | | | | | | 0.0074 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | 310 | 920 | 295 | | | | |
| Slope, ft/ft | | | | | 0.006 | 0.008 | 0.026 | | | | |
| Velocity[8], ft/sec | | | | | 1.627 | 1.878 | 3.386 | | | | |
| $T_t$, hr | | | | | 0.053 | 0.136 | 0.024 | | | | 0.2132 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.474 |
| **Min** | **88.42** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **11S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.012 | | | | | | | | | | |
| $T_t$[1], hr | 0.338 | | | | | | | | | | 0.3376 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 521 | 418 | | | | | | | | |
| Slope, ft/ft | | 0.011 | 0.008 | | | | | | | | |
| Velocity[4], ft/sec | | 0.7342 | 0.6261 | | | | | | | | |
| $T_t$[3], hr | | 0.197 | 0.185 | | | | | | | | 0.3826 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.720 |
| **Min** | **43.21** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **11S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.012 | | | | | | | | | | |
| $T_t$[1], hr | 0.338 | | | | | | | | | | 0.3376 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 521 | 418 | | | | | | | | |
| Slope, ft/ft | | 0.011 | 0.008 | | | | | | | | |
| Velocity[4], ft/sec | | 0.7342 | 0.6261 | | | | | | | | |
| $T_t$[3], hr | | 0.197 | 0.185 | | | | | | | | 0.3826 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.720 |
| | | | | | | | | | | **Min** | **43.21** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **12S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.800 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.047 | | | | | | | | | | |
| $T_t$[1], hr | 0.512 | | | | | | | | | | 0.5123 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 1687 | | | | | | | | |
| Slope, ft/ft | | | 0.007 | | | | | | | | |
| Velocity[4], ft/sec | | | 0.5857 | | | | | | | | |
| $T_t$[3], hr | | | 0.800 | | | | | | | | 0.8001 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 601 | | | | | | | | | |
| Slope, ft/ft | | 0.006 | | | | | | | | | |
| Velocity[5], ft/sec | | 0.3873 | | | | | | | | | |
| $T_t$[3], hr | | 0.431 | | | | | | | | | 0.4310 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.743 |
| **Min** | **104.61** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **12S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.800 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.047 | | | | | | | | | | |
| $T_t$[1], hr | 0.512 | | | | | | | | | | 0.5123 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 1687 | | | | | | | | |
| Slope, ft/ft | | | 0.007 | | | | | | | | |
| Velocity[4], ft/sec | | | 0.5857 | | | | | | | | |
| $T_t$[3], hr | | | 0.800 | | | | | | | | 0.8001 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 601 | | | | | | | | | |
| Slope, ft/ft | | 0.006 | | | | | | | | | |
| Velocity[5], ft/sec | | 0.3873 | | | | | | | | | |
| $T_t$[3], hr | | 0.431 | | | | | | | | | 0.4310 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 1.743 |
| | | | | | | | | | | **Min** | **104.61** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **13S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.023 | | | | | | | | | | |
| $T_t$[1], hr | 0.260 | | | | | | | | | | 0.2602 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1838 | | | | | | | | | |
| Slope, ft/ft | | 0.008 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.6261 | | | | | | | | | |
| $T_t$[3], hr | | 0.815 | | | | | | | | | 0.8155 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 418 | | | | | | | | |
| Slope, ft/ft | | | 0.005 | | | | | | | | |
| Velocity[5], ft/sec | | | 0.3536 | | | | | | | | |
| $T_t$[3], hr | | | 0.328 | | | | | | | | 0.3284 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.404 |
| **Min** | **84.25** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **13S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | | | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | | | |
| Slope, ft/ft | 0.023 | | | | | | | | | | | | |
| $T_t$[1], hr | 0.260 | | | | | | | | | | | | 0.2602 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | |
| Length, ft | | | 21 | | 21 | | | | | | | | |
| Slope, ft/ft | | | 0.019 | | 0.014 | | | | | | | | |
| Velocity[2], ft/sec | | | 2.223987 | | 1.90906 | | | | | | | | |
| $T_t$[3], hr | | | 0.003 | | 0.003 | | | | | | | | 0.0057 |
| **Cultivated** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | |
| Length, ft | | 99 | | 251 | | 1446 | | | | | | | |
| Slope, ft/ft | | 0.015 | | 0.009 | | 0.007 | | | | | | | |
| Velocity[4], ft/sec | | 0.8573 | | 0.6641 | | 0.5857 | | | | | | | |
| $T_t$[3], hr | | 0.032 | | 0.105 | | 0.686 | | | | | | | 0.8229 |
| **Woodland** | | | | | | | | | | | | | |
| Length, ft | | | | | | | 418 | | | | | | |
| Slope, ft/ft | | | | | | | 0.005 | | | | | | |
| Velocity[5], ft/sec | | | | | | | 0.3536 | | | | | | |
| $T_t$[3], hr | | | | | | | 0.328 | | | | | | 0.3284 |
| **CHANNEL FLOW** | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.417 |
| **Min** | **85.03** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 14S - Pre | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | | | |
| $T_t$[1], hr | 0.309 | | | | | | | | | | 0.3088 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 835 | | | | | | | | | |
| Slope, ft/ft | | 0.012 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.7668 | | | | | | | | | |
| $T_t$[3], hr | | 0.302 | | | | | | | | | 0.3025 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.611 |
| **Min** | **36.67** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | | | | | | | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | | **Checked By:** | PGT |
| **Subcatchment:** | **14S - POST** | | | | | | | | | **Revised:** | |
| Time of Concentration Determination Worksheet, SCS Methods | | | | | | | | | | | |
| | **Seg 1** | **Seg 2** | **Seg 3** | **Seg 4** | **Seg 5** | **Seg 6** | **Seg 7** | **Seg 8** | **Seg 9** | **Seg 10** | |
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | | | |
| $T_t$[1], hr | 0.309 | | | | | | | | | | 0.3088 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | 20 | | | | | | | | |
| Slope, ft/ft | | | 0.015 | | | | | | | | |
| Velocity[2], ft/sec | | | 1.976065 | | | | | | | | |
| $T_t$[3], hr | | | 0.003 | | | | | | | | 0.0028 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 128 | | 687 | | | | | | | |
| Slope, ft/ft | | 0.019 | | 0.01 | | | | | | | |
| Velocity[4], ft/sec | | 0.9649 | | 0.7000 | | | | | | | |
| $T_t$[3], hr | | 0.037 | | 0.273 | | | | | | | 0.3095 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.621 |
| | | | | | | | | | | **Min** | **37.26** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **15S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.022 | | | | | | | | | | |
| $T_t$[1], hr | 0.265 | | | | | | | | | | 0.2649 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 387 | 220 | | | | | | | | |
| Slope, ft/ft | | 0.021 | 0.004 | | | | | | | | |
| Velocity[4], ft/sec | | 1.0144 | 0.4427 | | | | | | | | |
| $T_t$[3], hr | | 0.106 | 0.138 | | | | | | | | 0.2440 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.509 |
| **Min** | **30.54** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **15S - POST** | | | | | | | | **Revised:** | | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.022 | | | | | | | | | | |
| $T_t$[1], hr | 0.265 | | | | | | | | | | 0.2649 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 387 | 220 | | | | | | | | |
| Slope, ft/ft | | 0.021 | 0.004 | | | | | | | | |
| Velocity[4], ft/sec | | 1.0144 | 0.4427 | | | | | | | | |
| $T_t$[3], hr | | 0.106 | 0.138 | | | | | | | | 0.2440 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.509 |
| **Min** | **30.54** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **16S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.410 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.017 | | | | | | | | | | |
| $T_t$[1], hr | 0.451 | | | | | | | | | | 0.4508 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 142 | 1035 | | | | | | | | |
| Slope, ft/ft | | 0.008 | 0.009 | | | | | | | | |
| Velocity[4], ft/sec | | 0.6261 | 0.6641 | | | | | | | | |
| $T_t$[3], hr | | 0.063 | 0.433 | | | | | | | | 0.4959 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | 334 | | | | | | | |
| Slope, ft/ft | | | | 0.017 | | | | | | | |
| Velocity[8], ft/sec | | | | 2.738 | | | | | | | |
| $T_t$, hr | | | | 0.034 | | | | | | | 0.0339 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.981 |
| **Min** | **58.83** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **16S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.410 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.017 | | | | | | | | | | |
| $T_t$[1], hr | 0.451 | | | | | | | | | | 0.4508 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 142 | 1035 | | | | | | | | |
| Slope, ft/ft | | 0.008 | 0.009 | | | | | | | | |
| Velocity[4], ft/sec | | 0.6261 | 0.6641 | | | | | | | | |
| $T_t$[3], hr | | 0.063 | 0.433 | | | | | | | | 0.4959 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | 334 | | | | | | | |
| Slope, ft/ft | | | | 0.017 | | | | | | | |
| Velocity[8], ft/sec | | | | 2.738 | | | | | | | |
| $T_t$, hr | | | | 0.034 | | | | | | | 0.0339 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.981 |
| **Min** | **58.83** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 16SA - Pre | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.027 | | | | | | | | | | |
| $T_t$[1], hr | 0.244 | | | | | | | | | | 0.2441 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 964 | | | | | | | | | |
| Slope, ft/ft | | 0.014 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | | | | | | | | |
| $T_t$[3], hr | | 0.323 | | | | | | | | | 0.3233 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 702 | | | | | | | | |
| Slope, ft/ft | | | 0.009 | | | | | | | | |
| Velocity[8], ft/sec | | | 1.992 | | | | | | | | |
| $T_t$, hr | | | 0.098 | | | | | | | | 0.0979 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.665 |
| **Min** | **39.92** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **16SA - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.027 | | | | | | | | | | |
| $T_t$[1], hr | 0.244 | | | | | | | | | | 0.2441 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 964 | | | | | | | | | |
| Slope, ft/ft | | 0.014 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | | | | | | | | |
| $T_t$[3], hr | | 0.323 | | | | | | | | | 0.3233 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 702 | | | | | | | | |
| Slope, ft/ft | | | 0.009 | | | | | | | | |
| Velocity[8], ft/sec | | | 1.992 | | | | | | | | |
| $T_t$, hr | | | 0.098 | | | | | | | | 0.0979 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.665 |
| | | | | | | | | | | **Min** | **39.92** |

| PROJECT: | Cordelio<br>Flat Creek Solar | Calculated By:<br>Date: | RLD<br>8/8/24 |
|---|---|---|---|
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 17S - Pre | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.400 | 0.240 | | | | | | | | | |
| Length, ft | 50 | 50 | | | | | | | | | |
| P2 , in | 2.39 | 2.39 | | | | | | | | | |
| Slope, ft/ft | 0.030 | 0.014 | | | | | | | | | |
| $T_t^1$, hr | 0.202 | 0.182 | | | | | | | | | 0.3845 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 2373 | 1418 | | | | | | | |
| Slope, ft/ft | | | 0.03 | 0.01 | | | | | | | |
| Velocity$^4$, ft/sec | | | 1.2124 | 0.7000 | | | | | | | |
| $T_t^3$, hr | | | 0.544 | 0.563 | | | | | | | 1.1064 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^5$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^7$, ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | 845 | | | | | | |
| Slope, ft/ft | | | | | 0.017 | | | | | | |
| Velocity$^8$, ft/sec | | | | | 2.738 | | | | | | |
| $T_t$, hr | | | | | 0.086 | | | | | | 0.0857 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity$^{11}$, ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.577 |
| **Min** | **94.60** |

**PROJECT:** Cordelio
Flat Creek Solar
**TRC Proj. No.:** 435979
**Subcatchment:** 17S - POST

**Calculated By:** RLD
**Date:** 8/8/24
**Checked By:** PGT
**Revised:**

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | | | | | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | | | |
| Manning's No. | 0.400 | 0.240 | | | | | | | | | | | | | |
| Length, ft | 50 | 50 | | | | | | | | | | | | | |
| P2 , in | 2.39 | 2.39 | | | | | | | | | | | | | |
| Slope, ft/ft | 0.030 | 0.014 | | | | | | | | | | | | | |
| $T_t$[1], hr | 0.202 | 0.182 | | | | | | | | | | | | | 0.3845 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | | | |
| Length, ft | | | | 20 | | 27 | | | | | | | | | |
| Slope, ft/ft | | | | 0.02 | | 0.011 | | | | | | | | | |
| Velocity[2], ft/sec | | | | 2.281763 | | 1.692201 | | | | | | | | | |
| $T_t$[3], hr | | | | 0.002 | | 0.004 | | | | | | | | | 0.0069 |
| **Cultivated** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | | | |
| Length, ft | | | 625 | | 1407 | | 293 | 1418 | | | | | | | |
| Slope, ft/ft | | | 0.005 | | 0.046 | | 0.009 | 0.01 | | | | | | | |
| Velocity[4], ft/sec | | | 0.4950 | | 1.5013 | | 0.6641 | 0.7000 | | | | | | | |
| $T_t$[3], hr | | | 0.351 | | 0.260 | | 0.123 | 0.563 | | | | | | | 1.2963 |
| **Woodland** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | 845 | | | | | | |
| Slope, ft/ft | | | | | | | | | 0.017 | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | 2.738 | | | | | | |
| $T_t$, hr | | | | | | | | | 0.086 | | | | | | 0.0857 |
| **Large Tributary** | | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.773 |
| **Min** | **106.41** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | | | | | | | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | | **Checked By:** | PGT |
| **Subcatchment:** | **18S - Pre** | | | | | | | | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.400 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | | | |
| $T_t$[1], hr | 0.465 | | | | | | | | | | 0.4646 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 205 | 2144 | | | | | | | | |
| Slope, ft/ft | | 0.010 | 0.092 | | | | | | | | |
| Velocity[5], ft/sec | | 0.5000 | 1.5166 | | | | | | | | |
| $T_t$[3], hr | | 0.114 | 0.393 | | | | | | | | 0.5066 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | 1440 | | | | | | | |
| Slope, ft/ft | | | | 0.038 | | | | | | | |
| Velocity[7], ft/sec | | | | 2.924 | | | | | | | |
| $T_t$, hr | | | | 0.137 | | | | | | | 0.1368 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.108 |
| **Min** | **66.48** |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **18S - POST** | | | | | | | | **Revised:** | | |
| Time of Concentration Determination Worksheet, SCS Methods | | | | | | | | | | | |
| | **Seg 1** | **Seg 2** | **Seg 3** | **Seg 4** | **Seg 5** | **Seg 6** | **Seg 7** | **Seg 8** | **Seg 9** | **Seg 10** | |
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.400 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | | | |
| $T_t$[1], hr | 0.465 | | | | | | | | | | 0.4646 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 205 | 2144 | | | | | | | | |
| Slope, ft/ft | | 0.010 | 0.092 | | | | | | | | |
| Velocity[5], ft/sec | | 0.5000 | 1.5166 | | | | | | | | |
| $T_t$[3], hr | | 0.114 | 0.393 | | | | | | | | 0.5066 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | 1440 | | | | | | | |
| Slope, ft/ft | | | | 0.038 | | | | | | | |
| Velocity[7], ft/sec | | | | 2.924 | | | | | | | |
| $T_t$, hr | | | | 0.137 | | | | | | | 0.1368 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 1.108 |
| | | | | | | | | | | **Min** | **66.48** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **19S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.400 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.010 | | | | | | | | | | |
| $T_t$[1], hr | 0.546 | | | | | | | | | | 0.5464 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 706 | 109 | 244 | | | | | | |
| Slope, ft/ft | | | 0.072 | 0.005 | 0.041 | | | | | | |
| Velocity[4], ft/sec | | | 1.8783 | 0.4950 | 1.4174 | | | | | | |
| $T_t$[3], hr | | | 0.104 | 0.061 | 0.048 | | | | | | 0.2134 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 1915 | | | | | | | | | |
| Slope, ft/ft | | 0.089 | | | | | | | | | |
| Velocity[5], ft/sec | | 1.4916 | | | | | | | | | |
| $T_t$[3], hr | | 0.357 | | | | | | | | | 0.3566 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | 706 | 923 | | | | |
| Slope, ft/ft | | | | | | 0.006 | 0.012 | | | | |
| Velocity[8], ft/sec | | | | | | 1.627 | 2.300 | | | | |
| $T_t$, hr | | | | | | 0.121 | 0.111 | | | | 0.2320 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.348 |
| **Min** | **80.91** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **19S - POST** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.400 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.010 | | | | | | | | | | |
| $T_t$[1], hr | 0.546 | | | | | | | | | | 0.5464 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 706 | 109 | 244 | | | | | | |
| Slope, ft/ft | | | 0.072 | 0.005 | 0.041 | | | | | | |
| Velocity[4], ft/sec | | | 1.8783 | 0.4950 | 1.4174 | | | | | | |
| $T_t$[3], hr | | | 0.104 | 0.061 | 0.048 | | | | | | 0.2134 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 1915 | | | | | | | | | |
| Slope, ft/ft | | 0.089 | | | | | | | | | |
| Velocity[5], ft/sec | | 1.4916 | | | | | | | | | |
| $T_t$[3], hr | | 0.357 | | | | | | | | | 0.3566 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | 706 | 923 | | | | |
| Slope, ft/ft | | | | | | 0.006 | 0.012 | | | | |
| Velocity[8], ft/sec | | | | | | 1.627 | 2.300 | | | | |
| $T_t$, hr | | | | | | 0.121 | 0.111 | | | | 0.2320 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.348 |
| **Min** | **80.91** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **20S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.017 | | | | | | | | | | |
| $T_t$[1], hr | 0.294 | | | | | | | | | | 0.2937 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1739 | | | | | | | | | |
| Slope, ft/ft | | 0.006 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.5422 | | | | | | | | | |
| $T_t$[3], hr | | 0.891 | | | | | | | | | 0.8909 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.185 |
| **Min** | **71.07** |

| PROJECT: | Cordelio | | Calculated By: | RLD |
|---|---|---|---|---|
| | Flat Creek Solar | | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | | Checked By: | PGT |
| Subcatchment: | 20S - POST | | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | | | Seg 5 | Seg 6 | | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | 0.240 | | | | | | | |
| Length, ft | 100 | | | | | | 100 | | | | | | | |
| P2 , in | 2.39 | | | | | | 2.39 | | | | | | | |
| Slope, ft/ft | 0.017 | | | | | | 0.003 | | | | | | | |
| $T_t^1$, hr | 0.294 | | | | | | 0.588 | | | | | | | 0.8815 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | | | |
| Length, ft | | | 20 | | 22 | | | | | | | | | |
| Slope, ft/ft | | | 0.01 | | 0.009 | | | | | | | | | |
| Velocity$^2$, ft/sec | | | 1.61345 | | 1.530653 | | | | | | | | | |
| $T_t^3$, hr | | | 0.003 | | 0.004 | | | | | | | | | 0.0074 |
| **Cultivated** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | | | |
| Length, ft | | 391 | | 981 | | 129 | | 94 | | | | | | |
| Slope, ft/ft | | 0.008 | | 0.006 | | 0.001 | | 0.002 | | | | | | |
| Velocity$^4$, ft/sec | | 0.6261 | | 0.5422 | | 0.2214 | | 0.3130 | | | | | | |
| $T_t^3$, hr | | 0.173 | | 0.503 | | 0.162 | | 0.083 | | | | | | 0.9213 |
| **Woodland** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^5$, ft/sec | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^7$, ft/sec | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | | | | |
| Velocity$^{11}$, ft/sec | | | | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.810 |
| **Min** | **108.61** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 21S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.041 | | | | | | | | |
| $T_t$[1], hr | 0.206 | | | | | | | | 0.2061 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 821 | | | | | | | |
| Slope, ft/ft | | 0.01 | | | | | | | |
| Velocity[4], ft/sec | | 0.7000 | | | | | | | |
| $T_t$[3], hr | | 0.326 | | | | | | | 0.3258 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.532 |
| **Min** | **31.91** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | POST 21S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.041 | | | | | | | | |
| $T_t$[1], hr | 0.206 | | | | | | | | 0.2061 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 821 | | | | | | | |
| Slope, ft/ft | | 0.01 | | | | | | | |
| Velocity[4], ft/sec | | 0.7000 | | | | | | | |
| $T_t$[3], hr | | 0.326 | | | | | | | 0.3258 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.532 |
| **Min** | **31.91** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 22S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | |
| $T_t$[1], hr | 0.478 | | | | | | | | 0.4782 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 1072 | | | | | | | |
| Slope, ft/ft | | 0.013 | | | | | | | |
| Velocity[4], ft/sec | | 0.7981 | | | | | | | |
| $T_t$[3], hr | | 0.373 | | | | | | | 0.3731 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 83 | | | | | | |
| Slope, ft/ft | | | 0.133 | | | | | | |
| Velocity[5], ft/sec | | | 1.8235 | | | | | | |
| $T_t$[3], hr | | | 0.013 | | | | | | 0.0126 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 184 | | | | | |
| Slope, ft/ft | | | | 0.011 | | | | | |
| Velocity[8], ft/sec | | | | 2.202 | | | | | |
| $T_t$, hr | | | | 0.023 | | | | | 0.0232 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.887 |
| **Min** | **53.23** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | POST 22S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | |
| $T_t$[1], hr | 0.478 | | | | | | | | 0.4782 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 1072 | | | | | | | |
| Slope, ft/ft | | 0.013 | | | | | | | |
| Velocity[4], ft/sec | | 0.7981 | | | | | | | |
| $T_t$[3], hr | | 0.373 | | | | | | | 0.3731 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 83 | | | | | | |
| Slope, ft/ft | | | 0.133 | | | | | | |
| Velocity[5], ft/sec | | | 1.8235 | | | | | | |
| $T_t$[3], hr | | | 0.013 | | | | | | 0.0126 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 184 | | | | | |
| Slope, ft/ft | | | | 0.011 | | | | | |
| Velocity[8], ft/sec | | | | 2.202 | | | | | |
| $T_t$, hr | | | | 0.023 | | | | | 0.0232 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.887 |
| **Min** | **53.23** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 23S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.042 | | | | | | | | |
| $T_t$[1], hr | 0.307 | | | | | | | | 0.3071 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 1941 | 806 | | | | | | |
| Slope, ft/ft | | 0.085 | 0.058 | | | | | | |
| Velocity[5], ft/sec | | 1.4577 | 1.2042 | | | | | | |
| $T_t$[3], hr | | 0.370 | 0.186 | | | | | | 0.5558 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | 770 | |
| Slope, ft/ft | | | | | | | | 0.012 | |
| Velocity[7], ft/sec | | | | | | | | 1.643 | |
| $T_t$, hr | | | | | | | | 0.130 | 0.1302 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 1740 | 1229 | 1895 | 650 | | |
| Slope, ft/ft | | | | 0.014 | 0.055 | 0.025 | 0.018 | | |
| Velocity[8], ft/sec | | | | 2.485 | 4.925 | 3.320 | 2.817 | | |
| $T_t$, hr | | | | 0.195 | 0.069 | 0.159 | 0.064 | | 0.4865 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.480 |
| **Min** | **88.77** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 23S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.042 | | | | | | | | |
| $T_t$[1], hr | 0.307 | | | | | | | | 0.3071 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 1941 | 806 | | | | | | |
| Slope, ft/ft | | 0.085 | 0.058 | | | | | | |
| Velocity[5], ft/sec | | 1.4577 | 1.2042 | | | | | | |
| $T_t$[3], hr | | 0.370 | 0.186 | | | | | | 0.5558 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | 770 | |
| Slope, ft/ft | | | | | | | | 0.012 | |
| Velocity[7], ft/sec | | | | | | | | 1.643 | |
| $T_t$, hr | | | | | | | | 0.130 | 0.1302 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 1740 | 1229 | 1895 | 650 | | |
| Slope, ft/ft | | | | 0.014 | 0.055 | 0.025 | 0.018 | | |
| Velocity[8], ft/sec | | | | 2.485 | 4.925 | 3.320 | 2.817 | | |
| $T_t$, hr | | | | 0.195 | 0.069 | 0.159 | 0.064 | | 0.4865 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.480 |
| **Min** | **88.77** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 24S** | **Revised:** | |

Time of Concentratio PRE 24S

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.025 | | | | | | | | |
| $T_t$[1], hr | 0.251 | | | | | | | | 0.2512 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 830 | | | | | | | |
| Slope, ft/ft | | 0.02 | | | | | | | |
| Velocity[4], ft/sec | | 0.9899 | | | | | | | |
| $T_t$[3], hr | | 0.233 | | | | | | | 0.2329 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 270 | | | | | | |
| Slope, ft/ft | | | 0.021 | | | | | | |
| Velocity[7], ft/sec | | | 2.174 | | | | | | |
| $T_t$, hr | | | 0.035 | | | | | | 0.0345 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.519 |
| **Min** | **31.11** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | POST 24S | Revised: | |

## Time of Concentratic PRE 24S

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.025 | | | | | | | | |
| $T_t$[1], hr | 0.251 | | | | | | | | 0.2512 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 830 | | | | | | | |
| Slope, ft/ft | | 0.02 | | | | | | | |
| Velocity[4], ft/sec | | 0.9899 | | | | | | | |
| $T_t$[3], hr | | 0.233 | | | | | | | 0.2329 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 270 | | | | | | |
| Slope, ft/ft | | | 0.021 | | | | | | |
| Velocity[7], ft/sec | | | 2.174 | | | | | | |
| $T_t$, hr | | | 0.035 | | | | | | 0.0345 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.519 |
| **Min** | **31.11** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | PRE 25S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | |
| $T_t^1$, hr | 0.280 | | | | | | | | 0.2803 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 640 | | | | | | |
| Slope, ft/ft | | | 0.03 | | | | | | |
| Velocity$^4$, ft/sec | | | 1.2124 | | | | | | |
| $T_t^3$, hr | | | 0.147 | | | | | | 0.1466 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 1281 | | | | | | | |
| Slope, ft/ft | | 0.051 | | | | | | | |
| Velocity$^5$, ft/sec | | 1.1292 | | | | | | | |
| $T_t^3$, hr | | 0.315 | | | | | | | 0.3151 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^7$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 4093 | 482 | 682 | | | |
| Slope, ft/ft | | | | 0.036 | 0.007 | 0.013 | | | |
| Velocity$^8$, ft/sec | | | | 3.984 | 1.757 | 2.394 | | | |
| $T_t$, hr | | | | 0.285 | 0.076 | 0.079 | | | 0.4407 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity$^{12}$, ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.183 |
| **Min** | **70.97** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 25S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | |
| $T_t^1$, hr | 0.280 | | | | | | | | 0.2803 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 640 | | | | | | |
| Slope, ft/ft | | | 0.03 | | | | | | |
| Velocity$^4$, ft/sec | | | 1.2124 | | | | | | |
| $T_t^3$, hr | | | 0.147 | | | | | | 0.1466 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 1281 | | | | | | | |
| Slope, ft/ft | | 0.051 | | | | | | | |
| Velocity$^5$, ft/sec | | 1.1292 | | | | | | | |
| $T_t^3$, hr | | 0.315 | | | | | | | 0.3151 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^7$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 4093 | 482 | 682 | | | |
| Slope, ft/ft | | | | 0.036 | 0.007 | 0.013 | | | |
| Velocity$^8$, ft/sec | | | | 3.984 | 1.757 | 2.394 | | | |
| $T_t$, hr | | | | 0.285 | 0.076 | 0.079 | | | 0.4407 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity$^{12}$, ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.183 |
| **Min** | **70.97** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 26S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | |
| $T_t$[1], hr | 0.308 | | | | | | | | 0.3081 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 720 | | | | | | |
| Slope, ft/ft | | | 0.008 | | | | | | |
| Velocity[4], ft/sec | | | 0.6261 | | | | | | |
| $T_t$[3], hr | | | 0.319 | | | | | | 0.3194 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | 527 | | | | | | | |
| Slope, ft/ft | | 0.012 | | | | | | | |
| Velocity[7], ft/sec | | 1.643 | | | | | | | |
| $T_t$, hr | | 0.089 | | | | | | | 0.0891 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.717 |
| **Min** | **43.00** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | POST 26S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.015 | | | | | | | | |
| $T_t$[1], hr | 0.308 | | | | | | | | 0.3081 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 720 | | | | | | |
| Slope, ft/ft | | | 0.008 | | | | | | |
| Velocity[4], ft/sec | | | 0.6261 | | | | | | |
| $T_t$[3], hr | | | 0.319 | | | | | | 0.3194 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | 527 | | | | | | | |
| Slope, ft/ft | | 0.012 | | | | | | | |
| Velocity[7], ft/sec | | 1.643 | | | | | | | |
| $T_t$, hr | | 0.089 | | | | | | | 0.0891 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.717 |
| **Min** | **43.00** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | **Calculated By:** | | RLD |
| | **Flat Creek Solar** | | | | | | **Date:** | | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | | | | **Checked By:** | | PGT |
| **Subcatchment:** | **PRE 27S** | | | | | | **Revised:** | | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.05 | | | | | | | | |
| $T_t$[1], hr | 0.190 | | | | | | | | 0.1904 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 973 | | 152 | 824 | | | | |
| Slope, ft/ft | | 0.097 | | 0.033 | 0.023 | | | | |
| Velocity[4], ft/sec | | 2.1801 | | 1.2716 | 1.0616 | | | | |
| $T_t$[3], hr | | 0.124 | | 0.033 | 0.216 | | | | 0.3728 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 548 | | | | | | |
| Slope, ft/ft | | | 0.082 | | | | | | |
| Velocity[5], ft/sec | | | 1.4318 | | | | | | |
| $T_t$[3], hr | | | 0.106 | | | | | | 0.1063 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | 510 | | | |
| Slope, ft/ft | | | | | | 0.008 | | | |
| Velocity[7], ft/sec | | | | | | 1.342 | | | |
| $T_t$, hr | | | | | | 0.106 | | | 0.1056 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.775 |
| **Min** | **46.50** |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | | | | **Calculated By:** | | RLD | |
| | **Flat Creek Solar** | | | | | | **Date:** | | 8/8/24 | |
| **TRC Proj. No.:** | **435979** | | | | | | **Checked By:** | | PGT | |
| **Subcatchment:** | **POST 27S** | | | | | | **Revised:** | | | |
| Time of Concentration Determination Worksheet, SCS Methods | | | | | | | | | | |
| | **Seg 1** | | **Seg 2** | **Seg 3** | **Seg 4** | **Seg 5** | **Seg 6** | **Seg 7** | **Seg 8** | |
| **SHEET FLOW** | | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | | |
| Slope, ft/ft | 0.05 | | | | | | | | | |
| $T_t$[1], hr | 0.190 | | | | | | | | | 0.1904 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | |
| **Paved** | | | | | | | | | | |
| Length, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | |
| Length, ft | | 20 | | | | | | | | |
| Slope, ft/ft | | 0.05 | | | | | | | | |
| Velocity[2], ft/sec | | 3.6077839 | | | | | | | | |
| $T_t$[3], hr | | 0.002 | | | | | | | | 0.0015 |
| **Cultivated** | | | | | | | | | | |
| Length, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | |
| Length, ft | | | 952 | | 152 | 824 | | | | |
| Slope, ft/ft | | | 0.098 | | 0.033 | 0.023 | | | | |
| Velocity[4], ft/sec | | | 2.1913 | | 1.2716 | 1.0616 | | | | |
| $T_t$[3], hr | | | 0.121 | | 0.033 | 0.216 | | | | 0.3695 |
| **Woodland** | | | | | | | | | | |
| Length, ft | | | | 548 | | | | | | |
| Slope, ft/ft | | | | 0.082 | | | | | | |
| Velocity[5], ft/sec | | | | 1.4318 | | | | | | |
| $T_t$[3], hr | | | | 0.106 | | | | | | 0.1063 |
| **CHANNEL FLOW** | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | |
| Length, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | |
| Length, ft | | | | | | | 510 | | | |
| Slope, ft/ft | | | | | | | 0.008 | | | |
| Velocity[7], ft/sec | | | | | | | 1.342 | | | |
| $T_t$, hr | | | | | | | 0.106 | | | 0.1056 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | |
| Length, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | |
| Length, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | |
| Manning's No. | | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | 0.0000 |
| | | | | | | | | | HR | 0.773 |
| | | | | | | | | | **Min** | **46.40** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | PRE 28S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.013 | | | | | | | | |
| $T_t$[1], hr | 0.326 | | | | | | | | 0.3263 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 163 | | | | | | | |
| Slope, ft/ft | | 0.029 | | | | | | | |
| Velocity[4], ft/sec | | 1.1921 | | | | | | | |
| $T_t$[3], hr | | 0.038 | | | | | | | 0.0380 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 2559 | | | | | | |
| Slope, ft/ft | | | 0.067 | | | | | | |
| Velocity[7], ft/sec | | | 3.883 | | | | | | |
| $T_t$, hr | | | 0.183 | | | | | | 0.1831 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.547 |
| **Min** | **32.84** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | POST 28S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.013 | | | | | | | | |
| $T_t$[1], hr | 0.326 | | | | | | | | 0.3263 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 163 | | | | | | | |
| Slope, ft/ft | | 0.029 | | | | | | | |
| Velocity[4], ft/sec | | 1.1921 | | | | | | | |
| $T_t$[3], hr | | 0.038 | | | | | | | 0.0380 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 2559 | | | | | | |
| Slope, ft/ft | | | 0.067 | | | | | | |
| Velocity[7], ft/sec | | | 3.883 | | | | | | |
| $T_t$, hr | | | 0.183 | | | | | | 0.1831 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.547 |
| **Min** | **32.84** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 29S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.065 | | | | | | | | |
| $T_t^1$, hr | 0.171 | | | | | | | | 0.1714 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 63 | | 612 | | | | | |
| Slope, ft/ft | | 0.095 | | 0.057 | | | | | |
| Velocity$^4$, ft/sec | | 2.1575 | | 1.6712 | | | | | |
| $T_t^3$, hr | | 0.008 | | 0.102 | | | | | 0.1098 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 31 | | 31 | | | | |
| Slope, ft/ft | | | 0.129 | | 0.61 | | | | |
| Velocity$^5$, ft/sec | | | 1.7958 | | 3.9051 | | | | |
| $T_t^3$, hr | | | 0.005 | | 0.002 | | | | 0.0070 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^6$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | 900 | | | |
| Slope, ft/ft | | | | | | 0.02 | | | |
| Velocity$^7$, ft/sec | | | | | | 2.121 | | | |
| $T_t$, hr | | | | | | 0.118 | | | 0.1179 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity$^{12}$, ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.406 |
| **Min** | **24.36** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 29S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.065 | | | | | | | | |
| $T_t^1$, hr | 0.171 | | | | | | | | 0.1714 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^4$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 63 | | 612 | | | | | |
| Slope, ft/ft | | 0.095 | | 0.057 | | | | | |
| $Velocity^4$, ft/sec | | 2.1575 | | 1.6712 | | | | | |
| $T_t^3$, hr | | 0.008 | | 0.102 | | | | | 0.1098 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 31 | | 31 | | | | |
| Slope, ft/ft | | | 0.129 | | 0.61 | | | | |
| $Velocity^5$, ft/sec | | | 1.7958 | | 3.9051 | | | | |
| $T_t^3$, hr | | | 0.005 | | 0.002 | | | | 0.0070 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^6$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | 900 | | | |
| Slope, ft/ft | | | | | | 0.02 | | | |
| $Velocity^7$, ft/sec | | | | | | 2.121 | | | |
| $T_t$, hr | | | | | | 0.118 | | | 0.1179 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| $Velocity^{12}$, ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.406 |
| **Min** | **24.36** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 30S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | |
| $T_t^1$, hr | 0.445 | | | | | | | | 0.4445 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^2$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^4$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 1152 | | | | | | | |
| Slope, ft/ft | | 0.070 | | | | | | | |
| $Velocity^4$, ft/sec | | 1.8520 | | | | | | | |
| $T_t^3$, hr | | 0.173 | | | | | | | 0.1728 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^5$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^6$, ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 175 | | | | | | |
| Slope, ft/ft | | | 0.023 | | | | | | |
| $Velocity^7$, ft/sec | | | 2.275 | | | | | | |
| $T_t$, hr | | | 0.021 | | | | | | 0.0214 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| $Velocity^8$, ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| $Velocity^{12}$, ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| | | | | | | | | HR | 0.639 |
| | | | | | | | | **Min** | **38.32** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **Post 30S** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | |
| $T_t$[1], hr | 0.445 | | | | | | | | 0.4445 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 1152 | | | | | | | |
| Slope, ft/ft | | 0.070 | | | | | | | |
| Velocity[4], ft/sec | | 1.8520 | | | | | | | |
| $T_t$[3], hr | | 0.173 | | | | | | | 0.1728 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | 175 | | | | | | |
| Slope, ft/ft | | | 0.023 | | | | | | |
| Velocity[7], ft/sec | | | 2.275 | | | | | | |
| $T_t$, hr | | | 0.021 | | | | | | 0.0214 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.639 |
| **Min** | **38.32** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 31S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.003 | | | | | | | | |
| $T_t$[1], hr | 0.587 | | | | | | | | 0.5866 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 219 | | 591.5 | | | | | |
| Slope, ft/ft | | 0.007 | | 0.044 | | | | | |
| Velocity[4], ft/sec | | 0.5857 | | 1.4683 | | | | | |
| $T_t$[3], hr | | 0.104 | | 0.112 | | | | | 0.2158 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 252 | | | | | | |
| Slope, ft/ft | | | 0.01 | | | | | | |
| Velocity[5], ft/sec | | | 0.5000 | | | | | | |
| $T_t$[3], hr | | | 0.140 | | | | | | 0.1400 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | 722 | | | | |
| Slope, ft/ft | | | | | 0.057 | | | | |
| Velocity[6], ft/sec | | | | | 2.865 | | | | |
| $T_t$[3], hr | | | | | 0.070 | | | | 0.0700 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.012 |
| **Min** | **60.74** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **Post 31S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.003 | | | | | | | | |
| $T_t^1$, hr | 0.587 | | | | | | | | 0.5866 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 219 | | 591.5 | | | | | |
| Slope, ft/ft | | 0.007 | | 0.044 | | | | | |
| Velocity[4], ft/sec | | 0.5857 | | 1.4683 | | | | | |
| $T_t^3$, hr | | 0.104 | | 0.112 | | | | | 0.2158 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | 252 | | | | | | |
| Slope, ft/ft | | | 0.01 | | | | | | |
| Velocity[5], ft/sec | | | 0.5000 | | | | | | |
| $T_t^3$, hr | | | 0.140 | | | | | | 0.1400 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | 722 | | | | |
| Slope, ft/ft | | | | | 0.057 | | | | |
| Velocity[6], ft/sec | | | | | 2.865 | | | | |
| $T_t^3$, hr | | | | | 0.070 | | | | 0.0700 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.012 |
| **Min** | **60.74** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 32S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.02 | | | | | | | | |
| $T_t$[1], hr | 0.275 | | | | | | | | 0.2746 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | 848 | 2083 | | | | | | |
| Slope, ft/ft | | 0.1 | 0.009 | | | | | | |
| Velocity[4], ft/sec | | 2.2136 | 0.6641 | | | | | | |
| $T_t$[3], hr | | 0.106 | 0.871 | | | | | | 0.9777 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.252 |
| **Min** | **75.14** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 32S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | | | Seg 3 | | | Seg 4 | Seg 5 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | | |
| Manning's No. | 0.24 | | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | | | | |
| Slope, ft/ft | 0.02 | | | | | | | | | | | |
| $T_t$[1], hr | 0.275 | | | | | | | | | | | 0.2746 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | | |
| Length, ft | | | 21 | | | 25 | | | | | | |
| Slope, ft/ft | | | 0.105 | | | 0.016 | | | | | | |
| Velocity[2], ft/sec | | | 5.228176 | | | 2.040871 | | | | | | |
| $T_t$[3], hr | | | 0.001 | | | 0.003 | | | | | | 0.0045 |
| **Cultivated** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | | |
| Length, ft | | 604 | | 222 | 630 | | 1429 | | | | | |
| Slope, ft/ft | | 0.08 | | 0.153 | 0.007 | | 0.009 | | | | | |
| Velocity[4], ft/sec | | 1.9799 | | 2.7381 | 0.5857 | | 0.6641 | | | | | |
| $T_t$[3], hr | | 0.085 | | 0.023 | 0.299 | | 0.598 | | | | | 1.0038 |
| **Woodland** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.283 |
| **Min** | **76.98** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 33S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.034 | | | | | | | | |
| $T_t$[1], hr | 0.334 | | | | | | | | 0.3342 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 1157 | | | | | | |
| Slope, ft/ft | | | 0.046 | | | | | | |
| Velocity[4], ft/sec | | | 1.5013 | | | | | | |
| $T_t$[3], hr | | | 0.214 | | | | | | 0.2141 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 932 | | 60 | | | | | |
| Slope, ft/ft | | 0.016 | | 0.312 | | | | | |
| Velocity[5], ft/sec | | 0.6325 | | 2.7928 | | | | | |
| $T_t$[3], hr | | 0.409 | | 0.006 | | | | | 0.4153 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | 141 | | | | |
| Slope, ft/ft | | | | | 0.023 | | | | |
| Velocity[8], ft/sec | | | | | 3.185 | | | | |
| $T_t$, hr | | | | | 0.012 | | | | 0.0123 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.976 |
| **Min** | **58.55** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **Post 33S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | | | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | | | |
| Slope, ft/ft | 0.034 | | | | | | | | | | |
| $T_t$[1], hr | 0.334 | | | | | | | | | | 0.3342 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | 34 | | | | | | | |
| Slope, ft/ft | | | | 0.085 | | | | | | | |
| Velocity[2], ft/sec | | | | 4.703975 | | | | | | | |
| $T_t$[3], hr | | | | 0.002 | | | | | | | 0.0020 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | 808 | | 315 | | | | | | |
| Slope, ft/ft | | | 0.042 | | 0.054 | | | | | | |
| Velocity[4], ft/sec | | | 1.4346 | | 1.6267 | | | | | | |
| $T_t$[3], hr | | | 0.156 | | 0.054 | | | | | | 0.2102 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 932 | | | | 60 | | | | | |
| Slope, ft/ft | | 0.016 | | | | 0.312 | | | | | |
| Velocity[5], ft/sec | | 0.6325 | | | | 2.7928 | | | | | |
| $T_t$[3], hr | | 0.409 | | | | 0.006 | | | | | 0.4153 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | 141 | | | | |
| Slope, ft/ft | | | | | | | 0.023 | | | | |
| Velocity[8], ft/sec | | | | | | | 3.185 | | | | |
| $T_t$, hr | | | | | | | 0.012 | | | | 0.0123 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.974 |
| **Min** | **58.45** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | PRE 34S | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.032 | | | | | | | | |
| $T_t$[1], hr | 0.342 | | | | | | | | 0.3424 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 1058 | | | | | | |
| Slope, ft/ft | | | 0.019 | | | | | | |
| Velocity[4], ft/sec | | | 0.9649 | | | | | | |
| $T_t$[3], hr | | | 0.305 | | | | | | 0.3046 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 130 | | | | | | | |
| Slope, ft/ft | | 0.022 | | | | | | | |
| Velocity[5], ft/sec | | 0.7416 | | | | | | | |
| $T_t$[3], hr | | 0.049 | | | | | | | 0.0487 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 155 | | | | | |
| Slope, ft/ft | | | | 0.181 | | | | | |
| Velocity[8], ft/sec | | | | 8.934 | | | | | |
| $T_t$, hr | | | | 0.005 | | | | | 0.0048 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.701 |
| **Min** | **42.03** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 34S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.4 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.032 | | | | | | | | |
| $T_t$[1], hr | 0.342 | | | | | | | | 0.3424 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | 1058 | | | | | | |
| Slope, ft/ft | | | 0.019 | | | | | | |
| Velocity[4], ft/sec | | | 0.9649 | | | | | | |
| $T_t$[3], hr | | | 0.305 | | | | | | 0.3046 |
| **Woodland** | | | | | | | | | |
| Length, ft | | 130 | | | | | | | |
| Slope, ft/ft | | 0.022 | | | | | | | |
| Velocity[5], ft/sec | | 0.7416 | | | | | | | |
| $T_t$[3], hr | | 0.049 | | | | | | | 0.0487 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | 155 | | | | | |
| Slope, ft/ft | | | | 0.181 | | | | | |
| Velocity[8], ft/sec | | | | 8.934 | | | | | |
| $T_t$, hr | | | | 0.005 | | | | | 0.0048 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.701 |
| **Min** | **42.03** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **PRE 35S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | |
| Manning's No. | 0.011 | | | | | | | | |
| Length, ft | 100 | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | |
| $T_t$[1], hr | 0.041 | | | | | | | | 0.0406 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | |
| **Paved** | | | | | | | | | |
| Length, ft | | 755 | | | | | | | |
| Slope, ft/ft | | 0.059 | | | | | | | |
| Velocity[2], ft/sec | | 4.937703 | | | | | | | |
| $T_t$[3], hr | | 0.042 | | | | | | | 0.0425 |
| **Unpaved** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | |
| Length, ft | | | | 1445 | | | | | |
| Slope, ft/ft | | | | 0.038 | | | | | |
| Velocity[4], ft/sec | | | | 1.3646 | | | | | |
| $T_t$[3], hr | | | | 0.294 | | | | | 0.2942 |
| **Woodland** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | |
| Length, ft | | | 438 | | | | | | |
| Slope, ft/ft | | | 0.059 | | | | | | |
| Velocity[6], ft/sec | | | 2.915 | | | | | | |
| $T_t$[3], hr | | | 0.042 | | | | | | 0.0417 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | |
| Length, ft | | | | | 351 | | | | |
| Slope, ft/ft | | | | | 0.08 | | | | |
| Velocity[8], ft/sec | | | | | 5.940 | | | | |
| $T_t$, hr | | | | | 0.016 | | | | 0.0164 |
| **Large Tributary** | | | | | | | | | |
| Length, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | |
| Diameter, ft | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | |
| Manning's No. | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | |
| Length, L, ft | | | | | | | | | |
| $T_t$, hr | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.435 |
| **Min** | **26.12** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **POST 35S** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | | | Seg 5 | Seg 6 | Seg 7 | Seg 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.011 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.40 | | | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | | | |
| $T_t$[1], hr | 0.041 | | | | | | | | | | 0.0406 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | 755 | | | | | | | | | |
| Slope, ft/ft | | 0.059 | | | | | | | | | |
| Velocity[2], ft/sec | | 4.937703 | | | | | | | | | |
| $T_t$[3], hr | | 0.042 | | | | | | | | | 0.0425 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | 22 | | | | | | |
| Slope, ft/ft | | | | | 0.05 | | | | | | |
| Velocity[2], ft/sec | | | | | 3.607784 | | | | | | |
| $T_t$[3], hr | | | | | 0.002 | | | | | | 0.0017 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | 414 | | 1009 | | | | | |
| Slope, ft/ft | | | | 0.058 | | 0.029 | | | | | |
| Velocity[4], ft/sec | | | | 1.6858 | | 1.1921 | | | | | |
| $T_t$[3], hr | | | | 0.068 | | 0.235 | | | | | 0.3033 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 438 | | | | | | | | |
| Slope, ft/ft | | | 0.059 | | | | | | | | |
| Velocity[6], ft/sec | | | 2.915 | | | | | | | | |
| $T_t$[3], hr | | | 0.042 | | | | | | | | 0.0417 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | 351 | | | | |
| Slope, ft/ft | | | | | | | 0.08 | | | | |
| Velocity[8], ft/sec | | | | | | | 5.940 | | | | |
| $T_t$, hr | | | | | | | 0.016 | | | | 0.0164 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[12], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.446 |
| **Min** | **26.78** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **36S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.032 | | | | | | | | | | |
| $T_t$[1], hr | 0.228 | | | | | | | | | | 0.2280 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 372 | 0 | 0 | | | | | | | |
| Slope, ft/ft | | 0.052 | 0 | 0 | | | | | | | |
| Velocity[4], ft/sec | | 1.5962 | | | | | | | | | |
| $T_t$[3], hr | | 0.065 | | | | | | | | | 0.0647 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 0 | 105 | 0 | | | | | | | |
| Slope, ft/ft | | 0.000 | 0.061 | 0 | | | | | | | |
| Velocity[5], ft/sec | | | 1.2349 | | | | | | | | |
| $T_t$[3], hr | | | 0.024 | | | | | | | | 0.0236 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 2019 | 709 | 456 | | | | | |
| Slope, ft/ft | | | 0 | 0.053 | 0.037 | 0.09 | | | | | |
| Velocity[6], ft/sec | | | | 2.763 | 2.308 | 3.600 | | | | | |
| $T_t$[3], hr | | | | 0.203 | 0.085 | 0.035 | | | | | 0.3235 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.640 |
| **Min** | **38.39** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 36S - POST | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.032 | | | | | | | | | | |
| $T_t$[1], hr | 0.228 | | | | | | | | | | 0.2280 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 372 | 0 | 0 | | | | | | | |
| Slope, ft/ft | | 0.052 | 0 | 0 | | | | | | | |
| Velocity[4], ft/sec | | 1.5962 | | | | | | | | | |
| $T_t$[3], hr | | 0.065 | | | | | | | | | 0.0647 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 0 | 105 | 0 | | | | | | | |
| Slope, ft/ft | | 0.000 | 0.061 | 0 | | | | | | | |
| Velocity[5], ft/sec | | | 1.2349 | | | | | | | | |
| $T_t$[3], hr | | | 0.024 | | | | | | | | 0.0236 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 2019 | 709 | 456 | | | | | |
| Slope, ft/ft | | | 0 | 0.053 | 0.037 | 0.09 | | | | | |
| Velocity[6], ft/sec | | | | 2.763 | 2.308 | 3.600 | | | | | |
| $T_t$[3], hr | | | | 0.203 | 0.085 | 0.035 | | | | | 0.3235 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.640 |
| **Min** | **38.39** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **37S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | | | |
| $T_t$[1], hr | 0.281 | | | | | | | | | | 0.2809 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 169 | 0 | 1878 | | | | | | | |
| Slope, ft/ft | | 0.123 | 0 | 0.063 | | | | | | | |
| Velocity[4], ft/sec | | 2.4550 | | 1.7570 | | | | | | | |
| $T_t$[3], hr | | 0.019 | | 0.297 | | | | | | | 0.3160 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 0 | 366 | 0 | | | | | | | |
| Slope, ft/ft | | 0.000 | 0.103 | 0 | | | | | | | |
| Velocity[5], ft/sec | | | 1.6047 | | | | | | | | |
| $T_t$[3], hr | | | 0.063 | | | | | | | | 0.0634 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.660 |
| **Min** | **39.62** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **37S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.019 | | | | | | | | | | |
| $T_t$[1], hr | 0.281 | | | | | | | | | | 0.2809 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | 0 | 22 | | | | | | |
| Slope, ft/ft | | | | 0 | 0.078 | | | | | | |
| Velocity[2], ft/sec | | | | | 4.506121 | | | | | | |
| $T_t$[3], hr | | | | | 0.0014 | | | | | | 0.0014 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 169 | 0 | 173 | 0 | 1683 | | | | | |
| Slope, ft/ft | | 0.123 | 0 | 0.09 | 0 | 0.061 | | | | | |
| Velocity[4], ft/sec | | 2.4550 | | 2.1000 | | 1.7289 | | | | | |
| $T_t$[3], hr | | 0.019 | | 0.023 | | 0.270 | | | | | 0.3124 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 0 | 366 | 0 | | | | | | | |
| Slope, ft/ft | | 0.000 | 0.103 | 0 | | | | | | | |
| Velocity[5], ft/sec | | | 1.6047 | | | | | | | | |
| $T_t$[3], hr | | | 0.063 | | | | | | | | 0.0634 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.658 |
| **Min** | **39.48** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **38S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.020 | | | | | | | | | | |
| $T_t$[1], hr | 0.275 | | | | | | | | | | 0.2752 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 0 | 43 | | | | | | | | |
| Slope, ft/ft | | 0 | 0.031 | | | | | | | | |
| Velocity[4], ft/sec | | | 1.2325 | | | | | | | | |
| $T_t$[3], hr | | | 0.010 | | | | | | | | 0.0097 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 125 | 0 | 811 | | | | | | | |
| Slope, ft/ft | | 0.046 | 0 | 0.02 | | | | | | | |
| Velocity[5], ft/sec | | 1.0724 | | 0.7071 | | | | | | | |
| $T_t$[3], hr | | 0.032 | | 0.319 | | | | | | | 0.3510 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.636 |
| | | | | | | | | | | **Min** | **38.15** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **38S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.020 | | | | | | | | | | |
| $T_t$[1], hr | 0.275 | | | | | | | | | | 0.2752 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 0 | 106 | | | | | | | | |
| Slope, ft/ft | | 0 | 0.041 | | | | | | | | |
| Velocity[4], ft/sec | | | 1.4174 | | | | | | | | |
| $T_t$[3], hr | | | 0.021 | | | | | | | | 0.0208 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | 92 | 0 | 781 | | | | | | | |
| Slope, ft/ft | | 0.041 | 0 | 0.019 | | | | | | | |
| Velocity[5], ft/sec | | 1.0124 | | 0.6892 | | | | | | | |
| $T_t$[3], hr | | 0.025 | | 0.315 | | | | | | | 0.3400 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.636 |
| **Min** | **38.16** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **39S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.011 | | | | | | | | | | |
| $T_t$[1], hr | 0.350 | | | | | | | | | | 0.3496 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1194 | | | | | | | | | |
| Slope, ft/ft | | 0.01 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.7000 | | | | | | | | | |
| $T_t$[3], hr | | 0.474 | | | | | | | | | 0.4738 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 755 | | | | | | | | |
| Slope, ft/ft | | | 0.044 | | | | | | | | |
| Velocity[6], ft/sec | | | 2.517 | | | | | | | | |
| $T_t$[3], hr | | | 0.083 | | | | | | | | 0.0833 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.907 |
| **Min** | **54.40** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 39S - Post | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.011 | | | | | | | | | | |
| $T_t$[1], hr | 0.350 | | | | | | | | | | 0.3496 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1194 | | | | | | | | | |
| Slope, ft/ft | | 0.01 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.7000 | | | | | | | | | |
| $T_t$[3], hr | | 0.474 | | | | | | | | | 0.4738 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 755 | | | | | | | | |
| Slope, ft/ft | | | 0.044 | | | | | | | | |
| Velocity[6], ft/sec | | | 2.517 | | | | | | | | |
| $T_t$[3], hr | | | 0.083 | | | | | | | | 0.0833 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.907 |
| **Min** | **54.40** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 40S - Pre | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.018 | | | | | | | | | | |
| $T_t$[1], hr | 0.287 | | | | | | | | | | 0.2871 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1426 | | | | | | | | | |
| Slope, ft/ft | | 0.015 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8573 | | | | | | | | | |
| $T_t$[3], hr | | 0.462 | | | | | | | | | 0.4620 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 354 | | | | | | | | |
| Slope, ft/ft | | | 0.014 | | | | | | | | |
| Velocity[8], ft/sec | | | 2.485 | | | | | | | | |
| $T_t$, hr | | | 0.040 | | | | | | | | 0.0396 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.789 |
| **Min** | **47.32** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **40S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.018 | | | | | | | | | | |
| $T_t$[1], hr | 0.287 | | | | | | | | | | 0.2871 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1426 | | | | | | | | | |
| Slope, ft/ft | | 0.015 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8573 | | | | | | | | | |
| $T_t$[3], hr | | 0.462 | | | | | | | | | 0.4620 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 354 | | | | | | | | |
| Slope, ft/ft | | | 0.014 | | | | | | | | |
| Velocity[8], ft/sec | | | 2.485 | | | | | | | | |
| $T_t$, hr | | | 0.040 | | | | | | | | 0.0396 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.789 |
| **Min** | **47.32** |

| | | | | | |
|---|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | | **Checked By:** | PGT |
| **Subcatchment:** | **41S - Pre** | | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.007 | | | | | | | | | | |
| $T_t$[1], hr | 0.419 | | | | | | | | | | 0.4188 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 700 | | | | | | | | | |
| Slope, ft/ft | | 0.014 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | | | | | | | | |
| $T_t$[3], hr | | 0.235 | | | | | | | | | 0.2348 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 226 | | | | | | | | |
| Slope, ft/ft | | | 0.034 | | | | | | | | |
| Velocity[5], ft/sec | | | 0.9220 | | | | | | | | |
| $T_t$[3], hr | | | 0.068 | | | | | | | | 0.0681 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 218 | | | | | | | |
| Slope, ft/ft | | | 0 | 0.009 | | | | | | | |
| Velocity[6], ft/sec | | | | 1.138 | | | | | | | |
| $T_t$[3], hr | | | | 0.053 | | | | | | | 0.0532 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.775 |
| **Min** | **46.49** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **41S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.007 | | | | | | | | | | |
| $T_t$[1], hr | 0.419 | | | | | | | | | | 0.4188 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | 20 | | | | | | | | |
| Slope, ft/ft | | | 0.019 | | | | | | | | |
| Velocity[2], ft/sec | | | 2.223987 | | | | | | | | |
| $T_t$[3], hr | | | 0.002 | | | | | | | | 0.0025 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 504 | | 178 | | | | | | | |
| Slope, ft/ft | | 0.014 | | 0.014 | | | | | | | |
| Velocity[4], ft/sec | | 0.8283 | | 0.8283 | | | | | | | |
| $T_t$[3], hr | | 0.169 | | 0.060 | | | | | | | 0.2287 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | 226 | | | | | | |
| Slope, ft/ft | | | | | 0.034 | | | | | | |
| Velocity[5], ft/sec | | | | | 0.9220 | | | | | | |
| $T_t$[3], hr | | | | | 0.068 | | | | | | 0.0681 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 0 | | 218 | | | | | |
| Slope, ft/ft | | | 0 | 0 | | 0.009 | | | | | |
| Velocity[6], ft/sec | | | | | | 1.138 | | | | | |
| $T_t$[3], hr | | | | | | 0.053 | | | | | 0.0532 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.771 |
| **Min** | **46.28** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **42S - Pre** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.003 | | | | | | | | | | |
| $T_t$[1], hr | 0.588 | | | | | | | | | | 0.5878 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 335 | | | | | | | | | |
| Slope, ft/ft | | 0.018 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.9391 | | | | | | | | | |
| $T_t$[3], hr | | 0.099 | | | | | | | | | 0.0991 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 1133 | | | | | | | | |
| Slope, ft/ft | | | 0.041 | | | | | | | | |
| Velocity[5], ft/sec | | | 1.0124 | | | | | | | | |
| $T_t$[3], hr | | | 0.311 | | | | | | | | 0.3109 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 1841 | 1761 | 235 | | | | | |
| Slope, ft/ft | | | 0 | 0.023 | 0.021 | 0.015 | | | | | |
| Velocity[6], ft/sec | | | | 1.820 | 1.739 | 1.470 | | | | | |
| $T_t$[3], hr | | | | 0.281 | 0.281 | 0.044 | | | | | 0.6067 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.604 |
| **Min** | **96.27** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **42S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.003 | | | | | | | | | | |
| $T_t$[1], hr | 0.588 | | | | | | | | | | 0.5878 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 335 | 1133 | | | | | | | | |
| Slope, ft/ft | | 0.018 | 0.041 | | | | | | | | |
| Velocity[4], ft/sec | | 0.9391 | 1.4174 | | | | | | | | |
| $T_t$[3], hr | | 0.099 | 0.222 | | | | | | | | 0.3211 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 1841 | 1761 | 235 | | | | | |
| Slope, ft/ft | | | 0 | 0.023 | 0.021 | 0.015 | | | | | |
| Velocity[6], ft/sec | | | | 1.820 | 1.739 | 1.470 | | | | | |
| $T_t$[3], hr | | | | 0.281 | 0.281 | 0.044 | | | | | 0.6067 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 1.516 |
| | | | | | | | | | | **Min** | **90.94** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 43S - Pre | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.009 | | | | | | | | | | |
| $T_t$[1], hr | 0.379 | | | | | | | | | | 0.3788 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 171 | 104 | 1366 | 225 | | | | | | |
| Slope, ft/ft | | 0.013 | 0.143 | 0.031 | 0.027 | | | | | | |
| Velocity[4], ft/sec | | 0.7981 | 2.6471 | 1.2325 | 1.1502 | | | | | | |
| $T_t$[3], hr | | 0.060 | 0.011 | 0.308 | 0.054 | | | | | | 0.4326 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | 0 | 0 | 0 | 0 | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.811 |
| **Min** | **48.68** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **43S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.009 | | | | | | | | | | |
| $T_t$[1], hr | 0.379 | | | | | | | | | | 0.3788 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 171 | 104 | 1366 | 225 | | | | | | |
| Slope, ft/ft | | 0.013 | 0.143 | 0.031 | 0.027 | | | | | | |
| Velocity[4], ft/sec | | 0.7981 | 2.6471 | 1.2325 | 1.1502 | | | | | | |
| $T_t$[3], hr | | 0.060 | 0.011 | 0.308 | 0.054 | | | | | | 0.4326 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | 0 | 0 | 0 | 0 | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.811 |
| **Min** | **48.68** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **44S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.014 | | | | | | | | | | |
| $T_t^1$, hr | 0.317 | | | | | | | | | | 0.3174 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^2$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^4$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 477 | 0 | 0 | 0 | | | | | | |
| Slope, ft/ft | | 0.056 | 0 | 0 | 0 | | | | | | |
| Velocity$^4$, ft/sec | | 1.6565 | | | | | | | | | |
| $T_t^3$, hr | | 0.080 | | | | | | | | | 0.0800 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity$^5$, ft/sec | | | | | | | | | | | |
| $T_t^3$, hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 4083 | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | 0.006 | 0 | 0 | 0 | | | | | |
| Velocity$^6$, ft/sec | | | 0.930 | | | | | | | | |
| $T_t^3$, hr | | | 1.220 | | | | | | | | 1.2202 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^7$, ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity$^8$, ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, ft$^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity$^{11}$, ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.618 |
| **Min** | **97.05** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **44S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.014 | | | | | | | | | | |
| $T_t$[1], hr | 0.317 | | | | | | | | | | 0.3174 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 477 | 0 | 0 | 0 | | | | | | |
| Slope, ft/ft | | 0.056 | 0 | 0 | 0 | | | | | | |
| Velocity[4], ft/sec | | 1.6565 | | | | | | | | | |
| $T_t$[3], hr | | 0.080 | | | | | | | | | 0.0800 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 4083 | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | 0.006 | 0 | 0 | 0 | | | | | |
| Velocity[6], ft/sec | | | 0.930 | | | | | | | | |
| $T_t$[3], hr | | | 1.220 | | | | | | | | 1.2202 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 1.618 |
| **Min** | **97.05** |

| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
|---|---|---|---|
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **44SA - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.083 | | | | | | | | | | |
| $T_t$[1], hr | 0.156 | | | | | | | | | | 0.1558 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | 11 | | | | | | | | |
| Slope, ft/ft | | | 0.027 | | | | | | | | |
| Velocity[2], ft/sec | | | 2.651169 | | | | | | | | |
| $T_t$[3], hr | | | 0.001 | | | | | | | | 0.0012 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 735 | 0 | 293 | 0 | | | | | | |
| Slope, ft/ft | | 0.061 | 0 | 0.015 | 0 | | | | | | |
| Velocity[4], ft/sec | | 1.7289 | | 0.8573 | | | | | | | |
| $T_t$[3], hr | | 0.118 | | 0.095 | | | | | | | 0.2130 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | | 0 | 0 | 0 | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | 743 | | | | | | |
| Slope, ft/ft | | | | | 0.032 | | | | | | |
| Velocity[8], ft/sec | | | | | 3.757 | | | | | | |
| $T_t$, hr | | | | | 0.055 | | | | | | 0.0549 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.425 |
| **Min** | **25.49** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **44SA - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.083 | | | | | | | | | | |
| $T_t$[1], hr | 0.156 | | | | | | | | | | 0.1558 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | 11 | | | | | | | | |
| Slope, ft/ft | | | 0.027 | | | | | | | | |
| Velocity[2], ft/sec | | | 2.651169 | | | | | | | | |
| $T_t$[3], hr | | | 0.001 | | | | | | | | 0.0012 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 735 | 0 | 293 | 0 | | | | | | |
| Slope, ft/ft | | 0.061 | 0 | 0.015 | 0 | | | | | | |
| Velocity[4], ft/sec | | 1.7289 | | 0.8573 | | | | | | | |
| $T_t$[3], hr | | 0.118 | | 0.095 | | | | | | | 0.2130 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | 0 | 0 | 0 | | | | | |
| Slope, ft/ft | | | | 0 | 0 | 0 | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | 743 | | | | | | |
| Slope, ft/ft | | | | | 0.032 | | | | | | |
| Velocity[8], ft/sec | | | | | 3.757 | | | | | | |
| $T_t$, hr | | | | | 0.055 | | | | | | 0.0549 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.425 |
| **Min** | **25.49** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **45S - Pre** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.012 | | | | | | | | | | |
| $T_t$[1], hr | 0.338 | | | | | | | | | | 0.3376 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 115 | | | | | | | | | |
| Slope, ft/ft | | 0.052 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.5962 | | | | | | | | | |
| $T_t$[3], hr | | 0.020 | | | | | | | | | 0.0200 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 762 | | | | | | | | |
| Slope, ft/ft | | | 0.019 | | | | | | | | |
| Velocity[6], ft/sec | | | 1.654 | | | | | | | | |
| $T_t$[3], hr | | | 0.128 | | | | | | | | 0.1280 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.486 |
| **Min** | **29.13** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **45S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.006 | | | | | | | | | | |
| $T_t$[1], hr | 0.445 | | | | | | | | | | 0.4455 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | 20 | | | | | | | | |
| Slope, ft/ft | | | 0.01 | | | | | | | | |
| Velocity[2], ft/sec | | | 1.61345 | | | | | | | | |
| $T_t$[3], hr | | | 0.003 | | | | | | | | 0.0034 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 14 | | 80 | | | | | | | |
| Slope, ft/ft | | 0.015 | | 0.07 | | | | | | | |
| Velocity[4], ft/sec | | 0.8573 | | 1.8520 | | | | | | | |
| $T_t$[3], hr | | 0.005 | | 0.012 | | | | | | | 0.0165 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | 762 | | | | | | |
| Slope, ft/ft | | | 0 | | 0.019 | | | | | | |
| Velocity[6], ft/sec | | | | | 1.654 | | | | | | |
| $T_t$[3], hr | | | | | 0.128 | | | | | | 0.1280 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| | | | | | | | | | | HR | 0.593 |
| | | | | | | | | | | **Min** | **35.60** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **46S - Pre** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | | | |
| $T_t$[1], hr | 0.479 | | | | | | | | | | 0.4792 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1200 | | | | | | | | | |
| Slope, ft/ft | | 0.016 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8854 | | | | | | | | | |
| $T_t$[3], hr | | 0.376 | | | | | | | | | 0.3765 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 744 | | | | | | | | |
| Slope, ft/ft | | | 0.057 | | | | | | | | |
| Velocity[8], ft/sec | | | 5.014 | | | | | | | | |
| $T_t$, hr | | | 0.041 | | | | | | | | 0.0412 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.897 |
| **Min** | **53.81** |

| PROJECT: | Cordelio | Calculated By: | RLD |
|---|---|---|---|
| | Flat Creek Solar | Date: | 8/8/24 |
| TRC Proj. No.: | 435979 | Checked By: | PGT |
| Subcatchment: | 46S - Post | Revised: | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.005 | | | | | | | | | | |
| $T_t$[1], hr | 0.479 | | | | | | | | | | 0.4792 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 1200 | | | | | | | | | |
| Slope, ft/ft | | 0.016 | | | | | | | | | |
| Velocity[4], ft/sec | | 0.8854 | | | | | | | | | |
| $T_t$[3], hr | | 0.376 | | | | | | | | | 0.3765 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | 744 | | | | | | | | |
| Slope, ft/ft | | | 0.057 | | | | | | | | |
| Velocity[8], ft/sec | | | 5.014 | | | | | | | | |
| $T_t$, hr | | | 0.041 | | | | | | | | 0.0412 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.897 |
| **Min** | **53.81** |

| | | | | |
|---|---|---|---|---|
| **PROJECT:** | **Cordelio** | | **Calculated By:** | RLD |
| | **Flat Creek Solar** | | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | | **Checked By:** | PGT |
| **Subcatchment:** | **47S - Pre** | | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.060 | | | | | | | | | | |
| $T_t$[1], hr | 0.177 | | | | | | | | | | 0.1773 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 2662 | | | | | | | | | |
| Slope, ft/ft | | 0.025 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.1068 | | | | | | | | | |
| $T_t$[3], hr | | 0.668 | | | | | | | | | 0.6681 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | 288 | | 146 | | | | | | |
| Slope, ft/ft | | | 0.005 | | 0.031 | | | | | | |
| Velocity[7], ft/sec | | | 1.061 | | 2.641 | | | | | | |
| $T_t$, hr | | | 0.075 | | 0.015 | | | | | | 0.0908 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | 2 | | | | | | | |
| Area, $ft^2$ | | | | 3.14 | | | | | | | |
| Wetted Perimeter, ft | | | | 6.28 | | | | | | | |
| Hydraulic Radius, R, ft | | | | 0.5 | | | | | | | |
| Slope, ft/ft | | | | 0.005 | | | | | | | |
| Manning's No. | | | | 0.025 | | | | | | | |
| Velocity[11], ft/sec | | | | 2.654265 | | | | | | | |
| Length, L, ft | | | | 56 | | | | | | | |
| $T_t$, hr | | | | 0.00586 | | | | | | | 0.0059 |

| | |
|---|---|
| HR | 0.942 |
| **Min** | **56.52** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **47S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.054 | | | | | | | | | | |
| $T_t$[1], hr | 0.185 | | | | | | | | | | 0.1850 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 2683 | | | | | | | | | |
| Slope, ft/ft | | 0.027 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.1502 | | | | | | | | | |
| $T_t$[3], hr | | 0.648 | | | | | | | | | 0.6479 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | 288 | | 146 | | | | | | |
| Slope, ft/ft | | | 0.005 | | 0.031 | | | | | | |
| Velocity[7], ft/sec | | | 1.061 | | 2.641 | | | | | | |
| $T_t$, hr | | | 0.075 | | 0.015 | | | | | | 0.0908 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | 2 | | | | | | | |
| Area, ft$^2$ | | | | 3.14 | | | | | | | |
| Wetted Perimeter, ft | | | | 6.28 | | | | | | | |
| Hydraulic Radius, R, ft | | | | 0.5 | | | | | | | |
| Slope, ft/ft | | | | 0.005 | | | | | | | |
| Manning's No. | | | | 0.025 | | | | | | | |
| Velocity[11], ft/sec | | | | 2.654265 | | | | | | | |
| Length, L, ft | | | | 56 | | | | | | | |
| $T_t$, hr | | | | 0.00586 | | | | | | | 0.0059 |

| | |
|---|---|
| HR | 0.930 |
| **Min** | **55.77** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **48S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| P2 , in | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| $T_t$[1], hr | | | | | | | | | | | 0.0000 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.000 |
| **Min** | **6.00** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **49S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | 0.240 | | | | | | | | | | |
| Length, ft | 100 | | | | | | | | | | |
| P2 , in | 2.39 | | | | | | | | | | |
| Slope, ft/ft | 0.068 | | | | | | | | | | |
| $T_t$[1], hr | 0.169 | | | | | | | | | | 0.1687 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | 725 | | | | | | | | | |
| Slope, ft/ft | | 0.036 | | | | | | | | | |
| Velocity[4], ft/sec | | 1.3282 | | | | | | | | | |
| $T_t$[3], hr | | 0.152 | | | | | | | | | 0.1516 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.320 |
| **Min** | **19.22** |

| | | | |
|---|---|---|---|
| **PROJECT:** | **Cordelio** | **Calculated By:** | RLD |
| | **Flat Creek Solar** | **Date:** | 8/8/24 |
| **TRC Proj. No.:** | **435979** | **Checked By:** | PGT |
| **Subcatchment:** | **50S - Post** | **Revised:** | |

## Time of Concentration Determination Worksheet, SCS Methods

| | Seg 1 | Seg 2 | Seg 3 | Seg 4 | Seg 5 | Seg 6 | Seg 7 | Seg 8 | Seg 9 | Seg 10 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHEET FLOW** | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| P2 , in | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| $T_t$[1], hr | | | | | | | | | | | 0.0000 |
| **SHALLOW CONCENTRATED FLOW** | | | | | | | | | | | |
| **Paved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Unpaved** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[2], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Cultivated** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Short Grass Pasture** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[4], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Woodland** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[5], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **CHANNEL FLOW** | | | | | | | | | | | |
| **Waterways & Swamps, No Channels** | | | | | | | | | | | |
| Length, ft | | | 0 | | | | | | | | |
| Slope, ft/ft | | | 0 | | | | | | | | |
| Velocity[6], ft/sec | | | | | | | | | | | |
| $T_t$[3], hr | | | | | | | | | | | 0.0000 |
| **Grassed Waterways/Roadside Ditches** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[7], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Small Tributary & Swamp w/Channels** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Large Tributary** | | | | | | | | | | | |
| Length, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Velocity[8], ft/sec | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |
| **Culvert** | | | | | | | | | | | |
| Diameter, ft | | | | | | | | | | | |
| Area, $ft^2$ | | | | | | | | | | | |
| Wetted Perimeter, ft | | | | | | | | | | | |
| Hydraulic Radius, R, ft | | | | | | | | | | | |
| Slope, ft/ft | | | | | | | | | | | |
| Manning's No. | | | | | | | | | | | |
| Velocity[11], ft/sec | | | | | | | | | | | |
| Length, L, ft | | | | | | | | | | | |
| $T_t$, hr | | | | | | | | | | | 0.0000 |

| | |
|---|---|
| HR | 0.000 |
| **Min** | **6.00** |

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 3,860 | sq-ft | |
| | 0.089 | ac | |
| Gravel Drive Area, A1: | 3,860 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.089 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 70.8 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-3**

| | | |
|---|---|---|
| Length, L: | 193 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 154.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 10,961 | sq-ft | |
| | 0.252 | ac | |
| Gravel Drive Area, A1: | 10,961 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.252 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.005 ac-ft**

**WQv = 201.0 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-4**

| | | |
|---|---|---|
| Length, L: | 551 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 440.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 4,230 | sq-ft | |
| | 0.097 | ac | |
| Gravel Drive Area, A1: | 4,230 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.097 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 77.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-5**

| | | |
|---|---|---|
| Length, L: | 200 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 160.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 4,762 | sq-ft |
| | 0.109 | ac |
| Gravel Drive Area, A1: | 4,762 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.109 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059

Min. Rv = 0.2

**Rv = 0.200**

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 87.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-6**

| | | |
|---|---|---|
| Length, L: | 241 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n

**Vol = 192.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 3,700 | sq-ft | |
| | 0.085 | ac | |
| Gravel Drive Area, A1: | 3,700 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.085 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 67.8 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-7**

| | | |
|---|---|---|
| Length, L: | 184 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 147.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 11,000 | sq-ft | |
| | 0.253 | ac | |
| Gravel Drive Area, A1: | 11,000 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.253 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.005 ac-ft**

**WQv = 201.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-8**

| | | |
|---|---|---|
| Length, L: | 538 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 430.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 22,129 | sq-ft | |
| | 0.508 | ac | |
| Gravel Drive Area, A1: | 22,129 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.508 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.009 ac-ft**

**WQv = 405.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-9**

| | | |
|---|---|---|
| Length, L: | 634 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 507.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 17,578 | sq-ft | |
| | 0.404 | ac | |
| Gravel Drive Area, A1: | 17,578 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.404 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.007 ac-ft**

**WQv = 322.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-10**

| | | |
|---|---|---|
| Length, L: | 803 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 642.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 15,295 | sq-ft | |
| | 0.351 | ac | |
| Gravel Drive Area, A1: | 15,295 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.351 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.006 ac-ft**

**WQv = 280.4 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-11**

| | | |
|---|---|---|
| Length, L: | 675 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 540.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,879 | sq-ft | |
| | 0.204 | ac | |
| Gravel Drive Area, A1: | 8,879 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.204 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.004 ac-ft**

**WQv = 162.8 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-12**

| | | |
|---|---|---|
| Length, L: | 438 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 350.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,607 | sq-ft | |
| | 0.037 | ac | |
| Gravel Drive Area, A1: | 1,607 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.037 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.001 ac-ft**

**WQv = 29.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-13**

| | | |
|---|---|---|
| Length, L: | 80 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 64.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 20,000 | sq-ft |
| | 0.459 | ac |
| Gravel Drive Area, A1: | 20,000 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.459 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.008 ac-ft**

**WQv = 366.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-14**

| | | |
|---|---|---|
| Length, L: | 1000 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 800.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 18,300 | sq-ft | |
| | 0.420 | ac | |
| Gravel Drive Area, A1: | 18,300 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.420 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.008 ac-ft**

**WQv = 335.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-15**

| | | |
|---|---|---|
| Length, L: | 915 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 732.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 7,427 | sq-ft | |
| | 0.171 | ac | |
| Gravel Drive Area, A1: | 7,427 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.171 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 136.2 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-16**

| | | |
|---|---|---|
| Length, L: | 371 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 296.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 6,159 | sq-ft | |
| | 0.141 | ac | |
| Gravel Drive Area, A1: | 6,159 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.141 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 112.9 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-17**

| | | |
|---|---|---|
| Length, L: | 308 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 246.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 7,149 | sq-ft | |
| | 0.164 | ac | |
| Gravel Drive Area, A1: | 7,149 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.164 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 131.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-18**

| | | |
|---|---|---|
| Length, L: | 357 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 285.6 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 4,874 | sq-ft | |
| | 0.112 | ac | |
| Gravel Drive Area, A1: | 4,874 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.112 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 89.4 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-19**

| | | |
|---|---|---|
| Length, L: | 244 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 195.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,748 | sq-ft | |
| | 0.201 | ac | |
| Gravel Drive Area, A1: | 8,748 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.201 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.004 ac-ft**

**WQv = 160.4 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-20**

| | | |
|---|---|---|
| Length, L: | 437 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 349.6 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,817 | sq-ft | |
| | 0.042 | ac | |
| Gravel Drive Area, A1: | 1,817 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.042 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.001 ac-ft**

**WQv = 33.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-21**

| | | |
|---|---|---|
| Length, L: | 90 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 72.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 6,200 | sq-ft | |
| | 0.142 | ac | |
| Gravel Drive Area, A1: | 6,200 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.142 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.003 ac-ft**

**WQv = 113.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-22**

| | | |
|---|---|---|
| Length, L: | 310 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 248.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 5,280 | sq-ft |
| | 0.121 | ac |
| Gravel Drive Area, A1: | 5,280 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.121 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059

Min. Rv = 0.2

**Rv = 0.200**

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 96.8 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-23**

| | | |
|---|---|---|
| Length, L: | 259 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n

**Vol = 207.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 10,796 | sq-ft | |
| | 0.248 | ac | |
| Gravel Drive Area, A1: | 10,796 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.248 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.005 ac-ft**

**WQv = 197.9 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-24**

| | | |
|---|---|---|
| Length, L: | 540 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 432.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 12,000 | sq-ft | |
| | 0.275 | ac | |
| Gravel Drive Area, A1: | 12,000 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.275 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.005 ac-ft**

**WQv = 220.0 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-25**

| | | |
|---|---|---|
| Length, L: | 580 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 464.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 9,143 | sq-ft | |
| | 0.210 | ac | |
| Gravel Drive Area, A1: | 9,143 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.210 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.004 ac-ft**

**WQv = 167.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-26**

| | | |
|---|---|---|
| Length, L: | 450 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 360.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 2,050 | sq-ft | |
| | 0.047 | ac | |
| Gravel Drive Area, A1: | 2,050 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.047 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.001 ac-ft**

**WQv = 37.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-27**

| | | |
|---|---|---|
| Length, L: | 106 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 84.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 15,360 | sq-ft | |
| | 0.353 | ac | |
| Gravel Drive Area, A1: | 15,360 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.353 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 — **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 — **WQv = 0.006 ac-ft**

**WQv = 281.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-28**

| | | |
|---|---|---|
| Length, L: | 768 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n — **Vol = 614.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 35,324 | sq-ft | |
| | 0.811 | ac | |
| Gravel Drive Area, A1: | 35,324 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.811 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.015 ac-ft**

**WQv = 647.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-29**

| | | |
|---|---|---|
| Length, L: | 1766 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 1,412.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 17,135 | sq-ft | |
| | 0.393 | ac | |
| Gravel Drive Area, A1: | 17,135 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.393 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.007 ac-ft**

**WQv = 314.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-30**

| | | |
|---|---|---|
| Length, L: | 790 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 632.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 3,726 | sq-ft | |
| | 0.086 | ac | |
| Gravel Drive Area, A1: | 3,726 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.086 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.002 ac-ft**

**WQv = 68.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-31**

| | | |
|---|---|---|
| Length, L: | 186 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 148.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## **Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### **Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,115 | sq-ft | |
| | 0.186 | ac | |
| Gravel Drive Area, A1: | 8,115 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.186 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 148.8 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-32**

| | | |
|---|---|---|
| Length, L: | 406 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 324.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 14,570 | sq-ft | |
| | 0.334 | ac | |
| Gravel Drive Area, A1: | 14,570 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.334 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.006 ac-ft**

**WQv = 267.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-34**

| | | |
|---|---|---|
| Length, L: | 660 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 528.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 5,021 | sq-ft | |
| | 0.115 | ac | |
| Gravel Drive Area, A1: | 5,021 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.115 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.002 ac-ft**

**WQv = 92.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-35**

| | | |
|---|---|---|
| Length, L: | 251 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 200.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,558 | sq-ft | |
| | 0.036 | ac | |
| Gravel Drive Area, A1: | 1,558 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.036 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.001 ac-ft**

**WQv = 28.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-36**

| | | |
|---|---|---|
| Length, L: | 78 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 62.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,153 | sq-ft | |
| | 0.187 | ac | |
| Gravel Drive Area, A1: | 8,153 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.187 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 149.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-37**

| | | |
|---|---|---|
| Length, L: | 380 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 304.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 9,721 | sq-ft |
| | 0.223 | ac |
| Gravel Drive Area, A1: | 9,721 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.223 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059

Min. Rv = 0.2

**Rv = 0.200**

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.004 ac-ft**

**WQv = 178.2 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-38**

| | | |
|---|---|---|
| Length, L: | 400 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n

**Vol = 320.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 7,235 | sq-ft | |
| | 0.166 | ac | |
| Gravel Drive Area, A1: | 7,235 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.166 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 132.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-39**

| | | |
|---|---|---|
| Length, L: | 372 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 297.6 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 3,306 | sq-ft |
| | 0.076 | ac |
| Gravel Drive Area, A1: | 3,306 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.076 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.001 ac-ft**

**WQv = 60.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-40**

| | | |
|---|---|---|
| Length, L: | 165 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 132.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 18,466 | sq-ft | |
| | 0.424 | ac | |
| Gravel Drive Area, A1: | 18,466 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.424 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.008 ac-ft**

**WQv = 338.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-41**

| | | |
|---|---|---|
| Length, L: | 923 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 738.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 5,433 | sq-ft | |
| | 0.125 | ac | |
| Gravel Drive Area, A1: | 5,433 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.125 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.002 ac-ft**

**WQv = 99.6 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-42**

| | | |
|---|---|---|
| Length, L: | 264 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 211.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

### Access Drives

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 1,810 | sq-ft |
| | 0.042 | ac |
| Gravel Drive Area, A1: | 1,810 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.042 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.001 ac-ft**

**WQv = 33.2 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-43**

| | | |
|---|---|---|
| Length, L: | 92 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 73.6 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 2,853 | sq-ft | |
| | 0.065 | ac | |
| Gravel Drive Area, A1: | 2,853 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.065 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.001 ac-ft**

**WQv = 52.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-44**

| | | |
|---|---|---|
| Length, L: | 143 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 114.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 5,723 | sq-ft | |
| | 0.131 | ac | |
| Gravel Drive Area, A1: | 5,723 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.131 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.002 ac-ft**

**WQv = 104.9 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-45**

| | | |
|---|---|---|
| Length, L: | 295 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 236.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,781 | sq-ft | |
| | 0.202 | ac | |
| Gravel Drive Area, A1: | 8,781 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.202 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.004 ac-ft**

**WQv = 161.0 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-46**

| | | |
|---|---|---|
| Length, L: | 437 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 349.6 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 8,602 | sq-ft | |
| | 0.197 | ac | |
| Gravel Drive Area, A1: | 8,602 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.197 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.004 ac-ft**

**WQv = 157.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-47**

| | | |
|---|---|---|
| Length, L: | 433 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 346.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,425 | sq-ft | |
| | 0.033 | ac | |
| Gravel Drive Area, A1: | 1,425 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.033 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.001 ac-ft**

**WQv = 26.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-48**

| | | |
|---|---|---|
| Length, L: | 73 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 58.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 7,313 | sq-ft | |
| | 0.168 | ac | |
| Gravel Drive Area, A1: | 7,313 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.168 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.003 ac-ft**

**WQv = 134.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-49**

| | | |
|---|---|---|
| Length, L: | 370 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 296.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 5,025 | sq-ft | |
| | 0.115 | ac | |
| Gravel Drive Area, A1: | 5,025 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.115 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.002 ac-ft**

**WQv = 92.1 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-50**

| | | |
|---|---|---|
| Length, L: | 251 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 200.8 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 7,500 | sq-ft | |
| | 0.172 | ac | |
| Gravel Drive Area, A1: | 7,500 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.172 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.003 ac-ft**

**WQv = 137.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-51**

| | | |
|---|---|---|
| Length, L: | 373 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 298.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,161 | sq-ft | |
| | 0.027 | ac | |
| Gravel Drive Area, A1: | 1,161 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.027 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.000 ac-ft**

**WQv = 21.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-52**

| | | |
|---|---|---|
| Length, L: | 115 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 92.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,510 | sq-ft | |
| | 0.035 | ac | |
| Gravel Drive Area, A1: | 1,510 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.035 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.001 ac-ft**

**WQv = 27.7 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-53**

| | | |
|---|---|---|
| Length, L: | 75 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 60.0 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 17,283 | sq-ft | |
| | 0.397 | ac | |
| Gravel Drive Area, A1: | 17,283 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.397 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.007 ac-ft**

**WQv = 316.9 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-54**

| | | |
|---|---|---|
| Length, L: | 853 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 682.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 1,471 | sq-ft | |
| | 0.034 | ac | |
| Gravel Drive Area, A1: | 1,471 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.034 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.001 ac-ft**

**WQv = 27.0 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-55**

| | | |
|---|---|---|
| Length, L: | 74 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 59.2 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

## Water Quality Volume Calculations

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | | |
|---|---|---|---|
| Subcatchment Area, A3: | 28,000 | sq-ft | |
| | 0.643 | ac | |
| Gravel Drive Area, A1: | 28,000 | sq-ft | |
| Meadow Area, A2: | 0 | sq-ft | |
| | 0.643 | ac | |
| | 0.000 | ac | |
| Percent Impervious Cover, I | 1.00 | % | |
| 90% Rainfall depth, P: | 1.10 | in | From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015 |

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12

**WQv = 0.012 ac-ft**

**WQv = 513.3 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-56**

| | | |
|---|---|---|
| Length, L: | 933 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 746.4 cu-ft**

| | | | |
|---|---|---|---|
| **Client:** | Cordelio | **Calculated By: RLD** | |
| **Project Name:** | Flat Creek Solar | **Checked By: PGT** | |
| **Project Number:** | 435979 | **Date:** | 8/8/24 |

**Water Quality Volume Calculations**

NYS Stormwater Management Design Manual, Chapter 4, Section 2 - "The Water Quality Volume (WQv) is intended to improve water quality by capturing and treating runoff from small, frequentstorm events that tend to contain higher pollutant levels. The WQv is directly related to the amount of impervious cover created at a site."

**Access Drives**

Runoff from sections of the access drive will flow to roadside infiltration trenches. This BMP will provide the required water quality treatment by infiltration or evaporation.

| | | |
|---|---|---|
| Subcatchment Area, A3: | 4,500 | sq-ft |
| | 0.103 | ac |
| Gravel Drive Area, A1: | 4,500 | sq-ft |
| Meadow Area, A2: | 0 | sq-ft |
| | 0.103 | ac |
| | 0.000 | ac |
| Percent Impervious Cover, I | 1.00 | % |
| 90% Rainfall depth, P: | 1.10 | in |

From Figure 4.1 - NYS Stormwater Management Design Manual, January 2015

**Calculate Volumetric Runoff Coefficient, Rv**

Rv = 0.05 + (0.009 * I) = 0.059 **Rv = 0.200**

Min. Rv = 0.2

**Calculate Water Quality Volume, WQv (ac-ft)**

WQv = (P * Rv * A)/12 **WQv = 0.002 ac-ft**

**WQv = 82.5 cu-ft**

**Provided Water Quality Volume, WQv (cu-ft)**

These calculations demonstrate that, as designed, the proposed infiltration trench(es) will provide adequate storage and treatment for the required Water Quality Volume.

**Infiltration Trench TR-57**

| | | |
|---|---|---|
| Length, L: | 225 | ft |
| Width, W: | 2 | ft |
| Depth, D: | 1 | ft |
| Porosity, n: | 0.4 | |

**Calculate Storage Volume, Vol (cu-ft)**

Vol = L * W * D * n **Vol = 180.0 cu-ft**

**Client:** Cordelio
**Project Name:** Flat Creek Solar
**Project Number:** 435979

**Water Quality BMP Table**

| VEGETATED FILTER STRIPS | | | VEGETATED FILTER STRIPS | | |
|---|---|---|---|---|---|
| **Vegetated Filter Strip ID** | **Width (ft)** | **Sheet No.** | **Vegetated Filter Strip ID** | **Width (ft)** | **Sheet No.** |
| VFS-1 | 50 | C-102-02 | VFS-66 | 60 | C-102-44 |
| VFS-2 | 75 | C-102-02 | VFS-67 | 60,90 | C-102-43 |
| VFS-5 | 50 | C-102-02 | VFS-68 | 60 | C-102-43,44 |
| VFS-6 | 75 | C-102-02 | VFS-69 | 60 | C-102-43,44 |
| VFS-7 | 60 | C-102-03 | VFS-70 | 60 | C-102-43 |
| VFS-8 | 50,75 | C-102-03 | VFS-71 | 60 | C-102-44 |
| VFS-10 | 50 | C-102-10 | VFS-72 | 60 | C-102-44,53 |
| VFS-11 | 75,60 | C-102-11 | VFS-73 | 60,90 | C-102-43 |
| VFS-12 | 60 | C-102-06 | VFS-74 | 60,75 | C-102-55 |
| VFS-13 | 50 | C-102-06 | VFS-75 | 75 | C-102-55 |
| VFS-14 | 90 | C-102-06 | VFS-76 | 50 | C-102-54 |
| VFS-16 | 60,75 | C-102-03,04 | VFS-77 | 60 | C-102-54 |
| VFS-18 | 50,100,86,58 | C-102-08 | VFS-78 | 60 | C-102-54 |
| VFS-19 | 60 | C-102-16 | VFS-79 | 75 | C-102-54 |
| VFS-20 | 86,75,50 | C-102-17 | VFS-80 | 58,60 | C-102-51 |
| VFS-21 | 100 | C-102-16 | VFS-81 | 60 | C-102-51 |
| VFS-22 | 75 | C-102-16 | VFS-82 | 60 | C-102-57 |
| VFS-23 | 75 | C-102-17 | VFS-83 | 60,90 | C-102-57 |
| VFS-24 | 50 | C-102-17 | VFS-85 | 60 | C-102-57 |
| VFS-26 | 60 | C-102-11 | VFS-86 | 60 | C-102-58 |
| VFS-27 | 60,50 | C-102-12,19 | VFS-87 | 58,60,86 | C-102-50,56 |
| VFS-28 | 60 | C-102-12 | VFS-89 | 60 | C-102-50 |
| VFS-29 | 60 | C-102-12 | VFS-90 | 58,60 | C-102-41,50 |
| VFS-32 | 58,86 | C-102-13 | VFS-92 | 60 | C-102-49 |
| VFS-33 | 60 | C-102-13 | VFS-93 | 60 | C-102-49 |
| VFS-34 | 60 | C-102-14 | VFS-94 | 60 | C-102-49 |
| VFS-35 | 60 | C-102-14 | VFS-95 | 60 | C-102-49 |
| VFS-36 | 60 | C-102-13 | VFS-96 | 60 | C-102-48 |
| VFS-38 | 60 | C-102-26 | VFS-97 | 60 | C-102-29 |
| VFS-39 | 60 | C-102-22,27 | VFS-99 | 60 | C-102-50 |
| VFS-41 | 60 | C-102-26 | VFS-100 | 60 | C-102-49 |
| VFS-42 | 60 | C-102-27 | VFS-101 | 50 | C-102-03 |
| VFS-43 | 60 | C-102-27 | VFS-102 | 50 | C-102-02 |
| VFS-44 | 60 | C-102-27 | VFS-103 | 50 | C-102-03 |
| VFS-46 | 60 | C-102-27 | VFS-104 | 90 | C-102-06 |
| VFS-47 | 60 | C-102-27 | VFS-106 | 60 | C-102-06 |
| VFS-48 | 60 | C-102-27 | VFS-107 | 58 | C-102-08 |
| VFS-49 | 60 | C-102-32 | VFS-108 | 60 | C-102-08 |
| VFS-50 | 60 | C-102-24 | VFS-109 | 60 | C-102-17 |
| VFS-52 | 60 | C-102-32 | VFS-110 | 58 | C-102-16 |
| VFS-53 | 60 | C-102-32 | VFS-111 | 75 | C-102-16 |
| VFS-54 | 58 | C-102-38 | VFS-112 | 50 | C-102-17 |
| VFS-55 | 60 | C-102-37 | VFS-113 | 60 | C-102-11 |
| VFS-56 | 60,90 | C-102-37 | VFS-114 | 60 | C-102-11 |
| VFS-57 | 60,90 | C-102-37,38 | VFS-115 | 60 | C-102-12 |
| VFS-59 | 60 | C-102-38,39 | VFS-116 | 60 | C-102-12 |
| VFS-60 | 60 | C-102-38 | VFS-117 | 60 | C-102-14 |
| VFS-61 | 58 | C-102-38,46 | VFS-118 | 58 | C-102-13 |
| VFS-62 | 86,90,115 | C-102-38,45 | VFS-119 | 60 | C-102-13 |
| VFS-63 | 115 | C-102-45 | VFS-120 | 60 | C-102-32 |
| VFS-64 | 60,86 | C-102-39,46,47 | VFS-121 | 60 | C-102-32 |
| VFS-65 | 90 | C-102-44 | VFS-122 | 60 | C-102-24 |

| VEGETATED FILTER STRIPS | | |
|---|---|---|
| **Vegetated Filter Strip ID** | **Width (ft)** | **Sheet No.** |
| VFS-123 | 60 | C-102-24 |
| VFS-124 | 60 | C-102-24 |
| VFS-125 | 60 | C-102-23 |
| VFS-126 | 60 | C-102-22 |
| VFS-127 | 60 | C-102-27 |
| VFS-128 | 60 | C-102-27 |
| VFS-129 | 60 | C-102-27 |
| VFS-130 | 60 | C-102-27 |
| VFS-131 | 60 | C-102-38 |
| VFS-132 | 60 | C-102-37 |
| VFS-133 | 60 | C-102-32 |
| VFS-134 | 60 | C-102-32 |
| VFS-135 | 58 | C-102-46 |
| VFS-136 | 60 | C-102-39 |
| VFS-137 | 58 | C-102-38 |
| VFS-138 | 75 | C-102-38 |
| VFS-139 | 60 | C-102-37 |
| VFS-140 | 60 | C-102-46 |
| VFS-142 | 90 | C-102-45 |
| VFS-143 | 86 | C-102-45 |
| VFS-144 | 90 | C-102-44 |
| VFS-145 | 60 | C-102-43 |
| VFS-146 | 60 | C-102-44 |
| VFS-147 | 60 | C-102-44 |
| VFS-148 | 60 | C-102-43 |
| VFS-149 | 60 | C-102-54 |
| VFS-150 | 60 | C-102-54 |
| VFS-151 | 60 | C-102-53 |
| VFS-152 | 60 | C-102-44 |
| VFS-153 | 60 | C-102-43 |
| VFS-154 | 50 | C-102-60 |
| VFS-155 | 75 | C-102-55 |
| VFS-156 | 58 | C-102-55 |
| VFS-157 | 50 | C-102-59 |
| VFS-158 | 50 | C-102-54 |
| VFS-159 | 60 | C-102-50 |
| VFS-160 | 60 | C-102-50 |
| VFS-161 | 60 | C-102-41 |
| VFS-162 | 60 | C-102-50 |
| VFS-163 | 58 | C-102-56 |
| VFS-164 | 60 | C-102-56 |
| VFS-165 | 60 | C-102-58 |
| VFS-166 | 60 | C-102-57 |
| VFS-167 | 60 | C-102-57 |
| VFS-168 | 60 | C-102-51 |
| VFS-169 | 90 | C-102-45 |
| VFS-170 | 60 | C-102-46 |
| VFS-171 | 60 | C-102-32 |
| VFS-172 | 86 | C-102-46 |
| VFS-173 | 60 | C-102-24 |
| VFS-174 | 60 | C-102-20 |

| INFILTRATION TRENCHES | | |
|---|---|---|
| **Infiltration Trench ID** | **Length (ft)** | **Sheet No.** |
| TR-3 | 193 | C-102-03 |
| TR-4 | 551 | C-102-03 |
| TR-5 | 200 | C-102-03 |
| TR-6 | 241 | C-102-06 |
| TR-7 | 184 | C-102-06 |
| TR-8 | 538 | C-102-06 |
| TR-9 | 634 | C-102-08 |
| TR-10 | 803 | C-102-16 |
| TR-11 | 675 | C-102-16 |
| TR-12 | 438 | C-102-16 |
| TR-13 | 80 | C-102-16 |
| TR-14 | 1000 | C-102-13 |
| TR-15 | 915 | C-102-20 |
| TR-16 | 371 | C-102-13 |
| TR-17 | 308 | C-102-13 |
| TR-18 | 357 | C-102-14 |
| TR-19 | 244 | C-102-14 |
| TR-20 | 437 | C-102-13 |
| TR-21 | 106 | C-102-27 |
| TR-22 | 310 | C-102-22 |
| TR-23 | 259 | C-102-27 |
| TR-24 | 540 | C-102-27 |
| TR-26 | 450 | C-102-32 |
| TR-27 | 106 | C-102-24 |
| TR-28 | 768 | C-102-24 |
| TR-29 | 1766 | C-102-37 |
| TR-30 | 790 | C-102-37 |
| TR-31 | 186 | C-102-38 |
| TR-32 | 406 | C-102-46 |
| TR-34 | 660 | C-102-44 |
| TR-35 | 251 | C-102-44 |
| TR-36 | 78 | C-102-55 |
| TR-37 | 380 | C-102-55 |
| TR-38 | 400 | C-102-55 |
| TR-39 | 372 | C-102-54,55 |
| TR-40 | 165 | C-102-54 |
| TR-41 | 923 | C-102-54 |
| TR-42 | 264 | C-102-54,55 |
| TR-43 | 92 | C-102-51 |
| TR-44 | 143 | C-102-51 |
| TR-45 | 295 | C-102-57 |
| TR-46 | 437 | C-102-58 |
| TR-47 | 433 | C-102-50 |
| TR-48 | 73 | C-102-50 |
| TR-49 | 370 | C-102-49 |
| TR-50 | 251 | C-102-49 |
| TR-51 | 373 | C-102-11 |
| TR-53 | 75 | C-102-32 |
| TR-54 | 853 | C-102-23 |
| TR-55 | 74 | C-102-29 |
| TR-56 | 933 | C-102-29 |
| TR-57 | 225 | C-102-49 |

**Client:** Cordelio
**Project Name:** Flat Creek Solar
**Project Number:** 435979

**VFS = Vegetated Filter Strip**
**TR = Infiltration Trench**
**SS = Substation**

**Water Quality BMP Summary**

| ALIGNMENT | BEGIN STA. | END STA. | SLOPE | HSG | WIDTH (FT) | BMP | NOTE |
|---|---|---|---|---|---|---|---|
| RD-01 | 0+00 | END | 0% - 8% | B | 50 | VFS-1 | |
| | | | | | | | |
| RD-02 | 0+55 | 2+00 | 8% - 12% | B | 75 | VFS-2 | |
| | | | | | | | |
| RD-05 | 0+00 | 0+30 | | | | Stream Crossing | |
| | 0+30 | 1+65 | 0% - 8% | B | 50 | VFS-5 | |
| | END | END | 8% - 12% | B | 75 | VFS-6 | |
| | | | | | | | |
| RD-07 | 0+00 | 0+40 | | | | Stream Crossing | |
| | 0+40 | 3+10 | 0% - 8% | D | 60 | VFS-7 | |
| | 3+10 | 5+10 | | | 2 | TR-3 | |
| | 5+10 | 7+50 | 0% - 8% | B | 50 | VFS-8 | |
| | 7+50 | 9+25 | 8% - 12% | B | 75 | VFS-8 | |
| | 9+25 | 14+75 | | | 2 | TR-4 | |
| | 14+75 | 21+60 | 0% - 8% | B | 50 | VFS-10 | |
| | 21+60 | 27+45 | 8% - 12% | B | 75 | VFS-11 | |
| | 27+45 | 28+30 | 0% - 8% | D | 60 | VFS-11 | |
| | 28+30 | 30+50 | | | | TR-5 | |
| | 30+50 | 31+15 | | | | Stream Crossing | |
| | 31+15 | 33+60 | 0% - 8% | D | 60 | VFS-12 | |
| | 33+60 | 36+00 | | | | TR-6 | |
| | 36+00 | 43+75 | 0% - 8% | B | 50 | VFS-13 | |
| | | | | | | | |
| RD-114 | 0+00 | 1+70 | | | 2 | TR-7 | |
| | 1+70 | 7+00 | | | 2 | TR-8 | |
| | 7+00 | END | 12% - 15% | D | 90 | VFS-14 | |
| | | | | | | | |
| RD-08 | 0+00 | 7+00 | 0% - 8% | D | 60 | VFS-16 | |
| | 7+00 | 9+40 | 8% - 12% | B | 75 | VFS-16 | |
| | | | | | | | |
| RD-14 | 0+00 | 2+00 | 0% - 8% | B | 50 | VFS-18 | |
| | 2+00 | 4+30 | 12% - 15% | B | 100 | VFS-18 | |
| | 4+30 | 6+75 | 0% - 8% | B | 50 | VFS-18 | |
| | 6+75 | 13+15 | 8% - 12% | C | 86 | VFS-18 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 13+15 | 15+60 | 0% - 8% | C | 58 | VFS-18 |
| | 15+60 | END | | | 2 | TR-9 |
| | | | | | | |
| RD-19 | 0 | 0+40 | | | | Stream Crossing |
| | 0+40 | 4+45 | 0% - 8% | D | 60 | VFS-19 |
| | 4+45 | 12+50 | | | 2 | TR-10 |
| | 12+50 | 12+80 | | | | Stream Crossing |
| | 12+80 | 19+60 | | | 2 | TR-11 |
| | 19+60 | 21+70 | 8% - 12% | C | 86 | VFS-20 |
| | 21+70 | 22+50 | 8% - 12% | B | 75 | VFS-20 |
| | 22+50 | END | 0% - 8% | B | 50 | VFS-20 |
| | | | | | | |
| RD-21 | 0+00 | 3+45 | 12% - 15% | B | 100 | VFS-21 |
| | 3+45 | 7+90 | | | 2 | TR-12 |
| | 7+90 | 8+10 | | | | Stream Crossing |
| | 8+10 | 8+90 | | | 2 | TR-13 |
| | END | END | 8% - 12% | B | 75 | VFS-22 |
| | | | | | | |
| RD-18 | 0+00 | 0+35 | | | | Stream Crossing |
| | 0+35 | 2+30 | 8% - 12% | B | 75 | VFS-23 |
| | END | END | 0% - 8% | B | 50 | VFS-24 |
| | | | | | | |
| RD-24 | 0+00 | 3+80 | | | 2 | TR-51 |
| | | | | | | |
| RD-26 | 0+00 | 0+40 | | | | Stream Crossing |
| | 0+40 | END | 0% - 8% | D | 60 | VFS-26 |
| | | | | | | |
| RD-28 | 0+00 | 0+40 | | | | Stream Crossing |
| | 0+40 | 6+90 | 0% - 8% | D | 60 | VFS-27 |
| | 6+90 | 9+40 | 0% - 8% | B | 50 | VFS-27 |
| | 9+40 | 11+10 | 0% - 8% | D | 60 | VFS-28 |
| | 11+10 | 11+40 | | | | Stream Crossing |
| | 11+40 | 14+00 | 0% - 8% | D | 60 | VFS-29 |
| | | | | | | |
| RD-105 | 0+00 | 9+30 | | | 2 | TR-15 |
| | 9+30 | 19+30 | | | 2 | TR-14 |
| | 19+30 | 19+50 | | | | Stream Crossing |
| | 19+50 | 23+20 | | | 2 | TR-16 |
| | 23+20 | 25+10 | 0% - 8% | C | 58 | VFS-32 |
| | 25+10 | 26+35 | 8% - 12% | C | 86 | VFS-32 |
| | 26+55 | 30+50 | 0% - 8% | D | 60 | VFS-33 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 30+50 | 33+60 | | | 2 | TR-17 |
| | 33+60 | 33+85 | | | | Stream Crossing |
| | 33+85 | 37+45 | | | 2 | TR-18 |
| | 37+45 | 42+35 | 0% - 8% | D | 60 | VFS-34 |
| | 42+35 | 44+80 | | | 2 | TR-19 |
| | 44+80 | END | 0% - 8% | D | 60 | VFS-35 |
| RD-32 | 1+00 | 5+35 | | | 2 | TR-20 |
| | 5+35 | 7+80 | 0% - 8% | D | 60 | VFS-36 |
| RD-34 | 0+00 | 3+00 | 0% - 8% | D | 60 | VFS-38 |
| | 3+00 | 3+90 | | | 2 | TR-21 |
| | 3+90 | 19+20 | 0% - 8% | D | 60 | VFS-39 |
| | 19+20 | 22+20 | | | 2 | TR-22 |
| RD-36 | 0+00 | 0+30 | | | | Stream Crossing |
| | 0+30 | 2+00 | 0% - 8% | D | 60 | VFS-41 |
| | 2+00 | 3+90 | | | 2 | TR-23 |
| | 3+90 | 6+55 | 0% - 8% | D | 60 | VFS-42 |
| | 6+55 | 8+80 | 0% - 8% | D | 60 | VFS-43 |
| | 8+80 | 9+30 | | | | Stream Crossing |
| | 9+30 | 12+90 | 0% - 8% | D | 60 | VFS-44 |
| | 12+50 | 17+90 | | | 2 | TR-24 |
| RD-107 | 0+00 | 3+75 | 0% - 8% | D | 60 | VFS-46 |
| | 3+75 | 4+10 | | | | Stream Crossing |
| | 4+10 | 8+35 | 0% - 8% | D | 60 | VFS-47 |
| | 8+35 | END | 0% - 8% | D | 60 | VFS-48 |
| RD-39 | 0+00 | 5+10 | 0% - 8% | D | 60 | VFS-49 |
| | 5+10 | 5+95 | | | 2 | TR-53 |
| | 5+95 | 6+35 | | | | Stream Crossing |
| | 6+35 | END | | | | TR-26 |
| RD-58 | 0+00 | 1+00 | | | 2 | TR-27 |
| | 1+00 | 8+15 | 0% - 8% | D | 60 | VFS-50 |
| | 8+15 | END | | | 2 | TR-28 |
| RD-46 | 0+00 | 2+85 | 0% - 8% | D | 60 | VFS-52 |
| | 2+85 | 3+10 | | | | Stream Crossing |
| | 3+10 | END | 0% - 8% | D | 60 | VFS-53 |

| | | | | | | |
|---|---|---|---|---|---|---|
| RD-48 | 0+00 | 0+40 | | | | Stream Crossing |
| | 0+40 | 8+35 | 0% - 8% | C | 58 | VFS-54 |
| | 8+35 | 26+00 | | | 2 | TR-29 |
| | 26+00 | 34+00 | | | 2 | TR-30 |
| | 34+00 | END | 0% - 8% | D | 60 | VFS-55 |
| RD-50 | 0+00 | 5+70 | 0% - 8% | D | 60 | VFS-56 |
| | 5+70 | 7+25 | 8% - 12% | D | 90 | VFS-56 |
| | 7+25 | 12+60 | 0% - 8% | D | 60 | VFS-56 |
| | 11+60 | 14+75 | 8% - 12% | D | 90 | VFS-57 |
| | 14+75 | 16+40 | 0% - 8% | D | 60 | VFS-57 |
| | 16+40 | 18+25 | | | 2 | TR-31 |
| RD-60 | 0+00 | 0+30 | | | | Stream Crossing |
| | 0+30 | 7+25 | 0% - 8% | D | 60 | VFS-59 |
| | 7+25 | END | 0% - 8% | D | 60 | VFS-60 |
| RD-64 | 0+00 | 0+40 | | | | Stream Crossing |
| | 0+40 | 3+90 | 0% - 8% | C | 58 | VFS-61 |
| | 3+90 | 8+00 | | | 2 | TR-32 |
| | 8+00 | 12+70 | 8% - 12% | C | 86 | VFS-62 |
| | 12+70 | 17+10 | 12% - 15% | C | 115 | VFS-62 |
| | 17+10 | 18+50 | 8% - 12% | C | 86 | VFS-62 |
| | 18+50 | 21+50 | 8% - 12% | D | 90 | VFS-62 |
| | 21+50 | 23+60 | 8% - 12% | D | 90 | VFS-169 |
| | 23+60 | 24+60 | 12% - 15% | C | 115 | VFS-63 |
| RD-62 | 0+00 | 0+45 | | | | Stream Crossing |
| | 0+45 | 1+50 | 0% - 8% | D | 60 | VFS-64 |
| | 1+50 | 10+00 | 8% - 12% | C | 86 | VFS-64 |
| | 11+70 | END | 0% - 8% | D | 60 | VFS-170 |
| RD-83 | 0+00 | 0+30 | | | | Stream Crossing |
| | 0+30 | END | 8% - 12% | D | 90 | VFS-65 |
| RD-84 | 0+00 | 1+50 | 0% - 8% | D | 60 | VFS-66 |
| | 1+50 | 8+20 | | | 2 | TR-34 |
| | 8+20 | 15+45 | 0% - 8% | D | 60 | VFS-67 |
| | 15+45 | 20+00 | 8% - 12% | D | 90 | VFS-67 |
| RD-77 | 0+00 | 0+30 | | | | Stream Crossing |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 0+30 | 7+40 | 0% - 8% | D | 60 | VFS-68 |
| | 7+40 | END | 0% - 8% | D | 60 | VFS-69 |
| | | | | | | |
| RD-111 | 0+00 | 6+75 | 0% - 8% | D | 60 | VFS-70 |
| | 7+20 | 9+00 | 0% - 8% | D | 60 | VFS-69 |
| | 9+00 | 11+50 | | | 2 | TR-35 |
| | 11+50 | 12+70 | 0% - 8% | D | 60 | VFS-71 |
| | 12+70 | 13+00 | | | | Stream Crossing |
| | 13+00 | END | 0% - 8% | D | 60 | VFS-72 |
| | | | | | | |
| RD-78 | 0+00 | 2+00 | 8% - 12% | D | 90 | VFS-73 |
| | 2+00 | 6+80 | 0% - 8% | D | 60 | VFS-73 |
| | 7+25 | END | 8% - 12% | D | 90 | VFS-68 |
| | | | | | | |
| RD-68 | 0+00 | 2+30 | 8% - 12% | B | 75 | VFS-74 |
| | 2+30 | 10+50 | 0% - 8% | D | 60 | VFS-74 |
| | 10+50 | 16+75 | 8% - 12% | B | 75 | VFS-74 |
| | 17+15 | END | 8% - 12% | B | 75 | VFS-75 |
| | | | | | | |
| RD-73 | 0+95 | 1+75 | | | 2 | TR-36 |
| | 1+75 | 5+70 | | | 2 | TR-37 |
| | 5+70 | 6+40 | | | | Stream Crossing |
| | 6+40 | 10+00 | | | 2 | TR-38 |
| | 10+00 | 13+90 | | | 2 | TR-39 |
| | 13+90 | 19+60 | 0% - 8% | B | 50 | VFS-76 |
| | 19+60 | 21+25 | | | 2 | TR-40 |
| | 21+25 | 30+00 | 0% - 8% | D | 60 | VFS-77 |
| | 30+00 | 39+25 | | | 2 | TR-41 |
| | 39+25 | END | 0% - 8% | D | 60 | VFS-78 |
| | | | | | | |
| RD-75 | 0+60 | 1+00 | | | | Stream Crossing |
| | 1+00 | 3+70 | | | 2 | TR-42 |
| | 3+70 | 4+60 | 8% - 12% | B | 75 | VFS-79 |
| | | | | | | |
| RD-87 | 0+00 | 0+30 | | | | Stream Crossing |
| | 0+30 | 2+30 | 0% - 8% | C | 58 | VFS-80 |
| | 2+30 | 4+30 | 0% - 8% | D | 60 | VFS-80 |
| | 4+30 | 6+20 | 0% - 8% | C | 58 | VFS-80 |
| | 6+20 | 7+10 | | | 2 | TR-43 |
| | 7+10 | 8+50 | | | 2 | TR-44 |
| | 8+50 | 14+75 | 0% - 8% | D | 60 | VFS-81 |
| | 14+75 | 17+75 | | | 2 | TR-45 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 17+75 | 28+50 | | | | Existing Road |
| | 28+50 | 33+50 | 0% - 8% | D | 60 | VFS-82 |
| | 33+50 | 34+75 | | | | Pond |
| | 34+75 | 37+00 | 0% - 8% | D | 60 | VFS-83 |
| | 37+00 | 38+75 | 8% - 12% | D | 90 | VFS-83 |
| | 38+75 | 44+50 | 0% - 8% | D | 60 | VFS-83 |
| RD-90 | 0+00 | END | 0% - 8% | D | 60 | VFS-85 |
| RD-88 | 0+00 | 5+45 | | | | Existing Road |
| | 5+45 | 5+75 | | | | Stream Crossing |
| | 5+75 | 10+15 | | | 2 | TR-46 |
| | 10+15 | END | 0% - 8% | D | 60 | VFS-86 |
| RD-93 | 0+00 | 0+25 | | | | Stream Crossing |
| | 0+25 | 4+80 | 0% - 8% | D | 60 | VFS-87 |
| | 4+80 | 8+00 | 0% - 8% | C | 58 | VFS-87 |
| | 8+00 | 9+55 | 8% - 12% | C | 86 | VFS-87 |
| | 9+55 | END | 0% - 8% | D | 60 | VFS-87 |
| RD-95 | 0+00 | 2+20 | | | 2 | TR-57 |
| | 2+20 | 6+00 | 0% - 8% | D | 60 | VFS-100 |
| | 6+00 | 12+90 | 0% - 8% | D | 60 | VFS-99 |
| | 12+90 | 13+40 | | | 2 | TR-48 |
| | 13+40 | 13+70 | | | | Stream Crossing |
| | 13+70 | 18+00 | | | 2 | TR-47 |
| | 18+00 | 27+90 | 0% - 8% | D | 60 | VFS-89 |
| | 27+90 | 28+30 | | | | Stream Crossing |
| | 28+30 | 33+05 | 0% - 8% | D | 60 | VFS-90 |
| | 33+05 | 33+75 | 0% - 8% | C | 58 | VFS-90 |
| | 33+75 | END | 0% - 8% | D | 60 | VFS-90 |
| RD-99 | 0+00 | 3+70 | | | 2 | TR-49 |
| | 3+60 | 5+70 | 0% - 8% | D | 60 | VFS-92 |
| | 5+70 | 8+20 | | | 2 | TR-50 |
| | 8+20 | 12+40 | 0% - 8% | D | 60 | VFS-93 |
| | 11+45 | 15+00 | 0% - 8% | D | 60 | VFS-94 |
| RD-100 | 0+00 | END | 0% - 8% | D | 60 | VFS-95 |
| RD-118 | 0+00 | 0+20 | | | | Stream Crossing |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0+20 | 8+70 | | | 2 | TR-54 | |
| | 9+50 | 10+20 | | | 2 | TR-55 | |
| | 10+20 | END | 0% - 8% | D | 60 | VFS-97 | SS |
| RD-120 | 0+00 | 0+30 | | | | Stream Crossing | |
| | 0+30 | END | | | 2 | TR-56 | |
| RD-127 | 0+00 | END | 0% - 8% | D | 60 | VFS-173 | |

| INVERTERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| A1-1 | | | 0% - 8% | B | 50 | VFS-2 | |
| A1-2 | | | 0% - 8% | B | 50 | VFS-102 | |
| A1-3 | | | 0% - 8% | B | 50 | VFS-103 | |
| A1-4 | | | 8% - 12% | D | 90 | VFS-104 | |
| A1-5 | | | 0% - 8% | D | 60 | VFS-106 | |
| A2-1 | | | 0% - 8% | B | 50 | VFS-101 | |
| A2-2 | | | 0% - 8% | D | 60 | VFS-16 | |
| A2-3 | | | 0% - 8% | D | 60 | VFS-16 | |
| B1-1 | | | 0% - 8% | C | 58 | VFS-107 | |
| B1-2 | | | 0% - 8% | D | 60 | VFS-108 | |
| C1-1 | | | 0% - 8% | D | 60 | VFS-109 | |
| C1-2 | | | 0% - 8% | C | 58 | VFS-110 | |
| C1-3 | | | 8% - 12% | B | 75 | VFS-111 | |
| C1-4 | | | 0% - 8% | B | 50 | VFS-112 | |
| D1-1 | | | 0% - 8% | D | 60 | VFS-113 | |
| D1-2 | | | 0% - 8% | D | 60 | VFS-114 | |
| D2-1 | | | 0% - 8% | D | 60 | VFS-115 | |
| D2-2 | | | 0% - 8% | D | 60 | VFS-116 | |
| D2-3 | | | 0% - 8% | D | 60 | VFS-174 | |
| D2-4 | | | 0% - 8% | D | 60 | VFS-117 | |
| D2-5 | | | 0% - 8% | C | 58 | VFS-118 | |
| D2-6 | | | 0% - 8% | D | 60 | VFS-119 | |
| E1-1 | | | 0% - 8% | D | 60 | VFS-120 | |
| E1-2 | | | 0% - 8% | D | 60 | VFS-121 | |
| E1-3 | | | 0% - 8% | D | 60 | VFS-122 | |
| E1-4 | | | 0% - 8% | D | 60 | VFS-123 | |
| E1-5 | | | 0% - 8% | D | 60 | VFS-124 | |
| E1-6 | | | 0% - 8% | D | 60 | VFS-125 | |
| E2-1 | | | 0% - 8% | D | 60 | VFS-131 | |
| E2-2 | | | 8% - 12% | D | 90 | VFS-57 | |
| E2-3 | | | 0% - 8% | D | 60 | VFS-132 | |
| E2-4 | | | 0% - 8% | D | 60 | VFS-133 | |
| E2-5 | | | 0% - 8% | D | 60 | VFS-171 | |
| E2-6 | | | 0% - 8% | D | 60 | VFS-134 | |
| E3-1 | | | 0% - 8% | D | 60 | VFS-126 | |

| | | | | |
|---|---|---|---|---|
| E3-2 | 0% - 8% | D | 60 | VFS-127 |
| E3-3 | 0% - 8% | D | 60 | VFS-128 |
| E3-4 | 0% - 8% | D | 60 | VFS-129 |
| E3-5 | 0% - 8% | D | 60 | VFS-130 |
| E4-1 | 0% - 8% | C | 58 | VFS-135 |
| E4-2 | 0% - 8% | D | 60 | VFS-136 |
| E4-3 | 0% - 8% | C | 58 | VFS-137 |
| E4-4 | 8% - 12% | B | 75 | VFS-138 |
| E4-5 | 0% - 8% | D | 60 | VFS-139 |
| E5-1 | 8% - 12% | C | 86 | VFS-172 |
| E5-2 | 0% - 8% | C | 58 | VFS-64 |
| E5-3 | 0% - 8% | D | 60 | VFS-140 |
| E5-4 | 8% - 12% | D | 90 | VFS-142 |
| E5-5 | 8% - 12% | C | 86 | VFS-143 |
| E6-1 | 8% - 12% | D | 90 | VFS-144 |
| E6-2 | 0% - 8% | D | 60 | VFS-145 |
| E6-3 | 0% - 8% | D | 60 | VFS-146 |
| E6-4 | 0% - 8% | D | 60 | VFS-147 |
| E6-5 | 0% - 8% | D | 60 | VFS-148 |
| E6-6 | 12% - 15% | D | 120 | VFS-67 |
| E7-1 | 0% - 8% | D | 60 | VFS-149 |
| E7-2 | 0% - 8% | D | 60 | VFS-150 |
| E7-3 | 0% - 8% | D | 60 | VFS-151 |
| E7-4 | 0% - 8% | D | 60 | VFS-152 |
| E7-5 | 0% - 8% | D | 60 | VFS-153 |
| E8-1 | 0% - 8% | B | 50 | VFS-154 |
| E8-2 | 8% - 12% | B | 75 | VFS-155 |
| E8-3 | 0% - 8% | C | 58 | VFS-156 |
| E8-4 | 0% - 8% | B | 50 | VFS-157 |
| E8-5 | 0% - 8% | B | 50 | VFS-158 |
| G1-1 | 0% - 8% | D | 60 | VFS-96 |
| G1-2 | 0% - 8% | D | 60 | VFS-95 |
| G1-3 | 0% - 8% | D | 60 | VFS-159 |
| G1-4 | 0% - 8% | D | 60 | VFS-160 |
| G2-1 | 0% - 8% | D | 60 | VFS-161 |
| G2-2 | 0% - 8% | D | 60 | VFS-162 |
| G2-3 | 0% - 8% | C | 58 | VFS-163 |
| G2-4 | 0% - 8% | D | 60 | VFS-164 |
| G2-5 | 0% - 8% | D | 60 | VFS-83 |
| G2-6 | 8% - 12% | D | 90 | VFS-83 |
| G3-1 | 0% - 8% | D | 60 | VFS-165 |
| G3-2 | 0% - 8% | D | 60 | VFS-166 |
| G3-3 | 0% - 8% | D | 60 | VFS-167 |
| G3-4 | 0% - 8% | D | 60 | VFS-168 |

**Client:** Cordelio
**Project Name:** Flat Creek Solar
**Project Number:** 435979

**Culvert Summary**

| Culvert | MATERIAL | DIA (INCHES) | LENGTH (FEET) | SLOPE (%) | INVERT IN | INVERT OUT | COMMENTS |
|---|---|---|---|---|---|---|---|
| SD01 | HDPE | 15 | 36 | 3.26 | 718.96 | 717.78 | NEW |
| SD02 | HDPE | 18 | 50 | 2.89 | 522.45 | 521.05 | NEW |
| SD03 | HDPE | 12 | 52 | 4.91 | 536.78 | 534.22 | REPLACE |
| SD05 | HDPE | 12 | 34 | 1.17 | 608.60 | 608.20 | REPLACE |
| SD06 | HDPE | 36 | 56 | 0.50 | 579.30 | 579.00 | REPLACE |
| SD07 | HDPE | 15 | 61 | 4.65 | 563.89 | 561.05 | REPLACE |
| SD08 | HDPE | 15 | 63 | 6.55 | 649.31 | 645.15 | REPLACE |
| SD09 | HDPE | 18 | 56 | 2.84 | 712.86 | 714.46 | NEW |
| SD10 | HDPE | 24 | 45 | 1.58 | 704.64 | 703.93 | NEW |
| SD11 | HDPE | 24 | 43 | 4.05 | 790.48 | 788.72 | NEW |
| SD12 | HDPE | 12 | 36 | 0.08 | 735.21 | 735.18 | NEW |
| SD13 | HDPE | 18 | 34 | 2.56 | 773.53 | 771.81 | NEW |
| SD14 | HDPE | 18 | 49 | 3.40 | 882.04 | 880.88 | NEW |
| SD15 | HDPE | 36 | 40 | 4.42 | 754.57 | 752.42 | NEW |
| SD16 | HDPE | 18 | 31 | 4.28 | 894.24 | 892.54 | NEW |
| SD17 | HDPE | 18 | 41 | 4.99 | 891.51 | 889.95 | REPLACE |
| SD18 | HDPE | 18 | | 6.65 | 878.73 | 875.98 | NEW |
| SD19 | 3 SIDED BOX CULVERT | 24' X 8' | 25 | 0.50 | 760.00 | 759.88 | NEW |
| SD20 | HDPE | 18 | 49 | 6.80 | 782.50 | 779.14 | REPLACE |
| SD21 | HDPE | 18 | 55 | 7.67 | 818.73 | 814.51 | REPLACE |
| SD22 | HDPE | 12 | 40 | 4.07 | 838.25 | 836.61 | NEW |
| SD23 | HDPE | 12 | 37 | 4.51 | 839.28 | 837.60 | NEW |
| SD24 | HDPE | 18 | 58 | 7.80 | 795.76 | 791.25 | REPLACE |
| SD25 | HDPE | 24 | 60 | 3.27 | 894.67 | 892.69 | REPLACE |
| SD26 | HDPE | 24 | 90 | 2.02 | 908.28 | 906.45 | REPLACE |
| SD27 | HDPE | 24 | 93 | 3.16 | 928.52 | 925.59 | NEW |
| SD28 | HDPE | 15 | 62 | 4.06 | 842.04 | 839.52 | REPLACE |
| SD29 | HDPE | 36 | 81 | 3.40 | 815.58 | 812.82 | REPLACE |
| SD30 | HDPE | 36 | 43 | 1.15 | 798.64 | 798.15 | REPLACE |
| SD31 | HDPE | 24 | 42 | 7.12 | 804.00 | 801.00 | REPLACE |
| SD32 | HDPE | 24 | 38 | 0.59 | 796.15 | 795.92 | NEW |
| SD33 | HDPE | 24 | 38 | 0.59 | 796.15 | 795.92 | NEW |
| SD34 | HDPE | 15 | 58 | 0.17 | 732.97 | 732.88 | REPLACE |
| | | | | | | | |

# Appendix J – Culvert Sizing Calculations

**Client:** Cordelio
**Project Name:** Flat Creek Solar
**Project Number:** 435979

**Culvert Summary**

| Culvert | MATERIAL | DIA (INCHES) | LENGTH (FEET) | SLOPE (%) | INVERT IN | INVERT OUT | COMMENTS |
|---|---|---|---|---|---|---|---|
| SD01 | HDPE | 15 | 36 | 3.26 | 718.96 | 717.78 | NEW |
| SD02 | HDPE | 18 | 50 | 2.89 | 522.45 | 521.05 | NEW |
| SD03 | HDPE | 12 | 52 | 4.91 | 536.78 | 534.22 | REPLACE |
| SD05 | HDPE | 12 | 34 | 1.17 | 608.60 | 608.20 | REPLACE |
| SD06 | HDPE | 36 | 56 | 0.50 | 579.30 | 579.00 | REPLACE |
| SD07 | HDPE | 15 | 61 | 4.65 | 563.89 | 561.05 | REPLACE |
| SD08 | HDPE | 15 | 63 | 6.55 | 649.31 | 645.15 | REPLACE |
| SD09 | HDPE | 18 | 56 | 2.84 | 712.86 | 714.46 | NEW |
| SD10 | HDPE | 24 | 45 | 1.58 | 704.64 | 703.93 | NEW |
| SD11 | HDPE | 24 | 43 | 4.05 | 790.48 | 788.72 | NEW |
| SD12 | HDPE | 12 | 36 | 0.08 | 735.21 | 735.18 | NEW |
| SD13 | HDPE | 18 | 34 | 2.56 | 773.53 | 771.81 | NEW |
| SD14 | HDPE | 18 | 49 | 3.40 | 882.04 | 880.88 | NEW |
| SD15 | HDPE | 36 | 40 | 4.42 | 754.57 | 752.42 | NEW |
| SD16 | HDPE | 18 | 31 | 4.28 | 894.24 | 892.54 | NEW |
| SD17 | HDPE | 18 | 41 | 4.99 | 891.51 | 889.95 | REPLACE |
| SD18 | HDPE | 18 | | 6.65 | 878.73 | 875.98 | NEW |
| SD19 | 3 SIDED BOX CULVERT | 24' X 8' | 25 | 0.50 | 760.00 | 759.88 | NEW |
| SD20 | HDPE | 18 | 49 | 6.80 | 782.50 | 779.14 | REPLACE |
| SD21 | HDPE | 18 | 55 | 7.67 | 818.73 | 814.51 | REPLACE |
| SD22 | HDPE | 12 | 40 | 4.07 | 838.25 | 836.61 | NEW |
| SD23 | HDPE | 12 | 37 | 4.51 | 839.28 | 837.60 | NEW |
| SD24 | HDPE | 18 | 58 | 7.80 | 795.76 | 791.25 | REPLACE |
| SD25 | HDPE | 24 | 60 | 3.27 | 894.67 | 892.69 | REPLACE |
| SD26 | HDPE | 24 | 90 | 2.02 | 908.28 | 906.45 | REPLACE |
| SD27 | HDPE | 24 | 93 | 3.16 | 928.52 | 925.59 | NEW |
| SD28 | HDPE | 15 | 62 | 4.06 | 842.04 | 839.52 | REPLACE |
| SD29 | HDPE | 36 | 81 | 3.40 | 815.58 | 812.82 | REPLACE |
| SD30 | HDPE | 36 | 43 | 1.15 | 798.64 | 798.15 | REPLACE |
| SD31 | HDPE | 24 | 42 | 7.12 | 804.00 | 801.00 | REPLACE |
| SD32 | HDPE | 24 | 38 | 0.59 | 796.15 | 795.92 | NEW |
| SD33 | HDPE | 24 | 38 | 0.59 | 796.15 | 795.92 | NEW |
| SD34 | HDPE | 15 | 58 | 0.17 | 732.97 | 732.88 | REPLACE |
| | | | | | | | |

# Appendix J – NYSDEC Solar Panel Construction Stormwater Permitting/SWPPP Guidance

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water, Bureau of Water Permits
625 Broadway, Albany, New York 12233-3505
P: (518) 402-8111 | F: (518) 402-9029
www.dec.ny.gov

# MEMORANDUM

**TO:** Regional Water Engineers

**FROM:** Robert Wither, Chief, South Permit Section

**SUBJECT:** Solar Panel Construction Stormwater Permitting/SWPPP Guidance

**DATE:** April 6, 2018

## Issue

The Department is seeing an increase in the number of solar panel construction projects across New York State. This has resulted in an increase in the number of questions on Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) requirements from design professionals because the current CGP (GP-0-15-002) does not include a specific reference to the SWPPP requirements for solar panel projects in Tables 1 and 2 of Appendix B. To address this issue, the Division of Water (DOW) has developed the following guidance on CGP/SWPPP requirements for the different types of solar panel projects.

## Scenario 1

The DOW considers solar panel projects designed and constructed in accordance with the following criteria to be a "*Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields)*" type project as listed in Table 1, Appendix B of the CGP. Therefore, the SWPPP for this type of project will typically just need to address erosion and sediment controls.

1. Solar panels are constructed on post or rack systems and elevated off the ground surface,
2. The panels are spaced apart so that rain water can flow off the down gradient side of the panel and continue as sheet flow across the ground surface*,
3. For solar panels constructed on slopes, the individual rows of solar panels are generally installed along the contour so rain water sheet flows down slope*,
4. The ground surface below the panels consist of a well-established vegetative cover (see "Final Stabilization" definition in Appendix A of the CGP),
5. The project does not include the construction of any traditional impervious areas (i.e. buildings, substation pads, gravel access roads or parking areas, etc.),
6. Construction of the solar panels will not alter the hydrology from pre-to post development conditions (see Appendix A of the CGP, for definition of "Alter the hydrology…"). Note: The design professional shall perform the necessary site assessment/hydrology analysis to make this determination.

*Refer to Maryland's "Stormwater Design Guidance- Solar Panel Installations" attached for guidance on panel installation.
**See notes below for additional criteria.

**Scenario 2**

If the design and construction of the solar panels meets all the criteria above, except for item 6, the project will fall under the "*All other construction activities that include the construction or reconstruction of impervious area or alter the hydrology from pre-to post development conditions, and are not listed in Table 1*" project type as listed in Table 2, Appendix B of the CGP. Therefore, the SWPPP for this type of project must address post-construction stormwater practices designed in accordance with the sizing criteria in Chapter 4 of the NYS Stormwater Management Design Manual, dated January 2015 (Note: Chapter 10 for projects in NYC EOH Watershed). The Water Quality Volume (WQv)/Runoff Reduction Volume (RRv) sizing criteria can be addressed by designing and constructing the solar panels in accordance with the criteria in items 1 – 4 above, however, the quantity control sizing criteria (Cpv, Qp and Qf) from Chapter 4 (or 10) of the Design Manual must still be addressed, unless one of the waiver criteria from Chapter 4 can be applied. **See notes below for additional criteria.

**** Notes**

**- Item 1:** For solar panel projects where the panels are mounted directly to the ground (i.e. no space below panel to allow for infiltration of runoff), the SWPPP must address post-construction stormwater management controls designed in accordance with the sizing criteria in Chapter 4 of the NYS Stormwater Management Design Manual, dated January 2015 (Note: Chapter 10 for projects in NYC EOH Watershed).

**- Item 5:** For solar panel projects that include the construction of traditional impervious areas (i.e. buildings, substation pads, gravel access roads or parking areas, etc.), the SWPPP must address post-construction stormwater management controls for those areas of the project. This applies to both Scenario 1 and 2 above.

cc: Carol Lamb-Lafay, BWP
Dave Gasper, BWP

**Appendix J – Maryland Department of the Environment (MDEP) Stormwater Design Guidance – Solar Panel Installation**

Maryland Department of the Environment

## Stormwater Design Guidance – Solar Panel Installations

Revisions to Maryland's stormwater management regulations in 2010 require that environmental site design (ESD) be used to the maximum extent practicable (MEP) to mimic natural hydrology, reduce runoff to reflect forested wooded conditions, and minimize the impact of land development on water resources. This applies to any residential, commercial, industrial, or institutional development where more than 5,000 square feet of land area is disturbed. Consequently, stormwater management must be addressed even when permeable features like solar panel installations exceed 5,000 square feet of land disturbance.

Depending on local soil conditions and proposed imperviousness, the amount of rainfall that stormwater requirements are based on varies from 1.0 to 2.6 inches. However, addressing stormwater management does not mean that structural or micro-scale practices must be constructed to capture and treat large volumes of runoff. Using nonstructural techniques like disconnecting impervious cover reduces runoff by promoting overland filtering and infiltration. Commonly used with smaller or narrower impervious areas like driveways or open roads, the Disconnection of Non-Rooftop Runoff technique (see pp. 5.61 to 5.65 of the **2000 Maryland Stormwater Design Manual**[1]) is a low cost alternative for treating runoff in situations like rows of solar panels.

When non-rooftop disconnection is used to treat runoff, the following factors should be considered:

- The vegetated area receiving runoff must be equal to or greater in length than the disconnected surface (e.g., width of the row of solar panels)
- Runoff must sheet flow onto and across vegetated areas to maintain the disconnection
- Disconnections should be located on gradual slopes (≤ 5%) to maintain sheetflow. Level spreaders, terraces, or berms may be used to maintain sheetflow conditions if the average slope is steeper than 5%. However, installations on slopes greater than 10% will require an engineered plan that ensures adequate treatment and the safe and non-erosive conveyance of runoff to the property line or downstream stormwater management practice.
- Disconnecting impervious surfaces works best in undisturbed soils. To minimize disturbance and compaction, construction vehicles and equipment should avoid areas used for disconnection during installation of the solar panels.
- Groundcover vegetation must be maintained in good condition in those areas receiving disconnected runoff. Typically this maintenance is no different than other lawn or landscaped areas. However, areas receiving runoff should be protected (e.g., planting shrubs or trees along the perimeter) from future compaction.

Depending on the layout and number of panels installed, the disconnection of non-rooftop runoff technique may address some or all of the stormwater management requirements for an individual project. Where the imperviousness is high or there is other infrastructure (e.g., access roads, transformers), additional runoff may need to be treated. In these situations, other ESD techniques or micro-scale practices may be needed to provide stormwater management for these features.

**Example 1 – Using Non-Rooftop Disconnection Where the Average Slope ≤ 5%**

Several rows of solar panels will be installed in an existing meadow. The soils within the meadow are hydrologic soil group (HSG) B and the average slope does not exceed 5%. Each row of panels is 10 feet wide and the distance between rows is 20 feet. The rows of solar panels will be installed according to Figure 1 below. In this scenario, the disconnection length is the same as the distance between rows (20 feet) and is greater than the width of each row (10 feet). Therefore, each row of panels is adequately disconnected and the runoff from 1.0 inch of rainfall is treated.

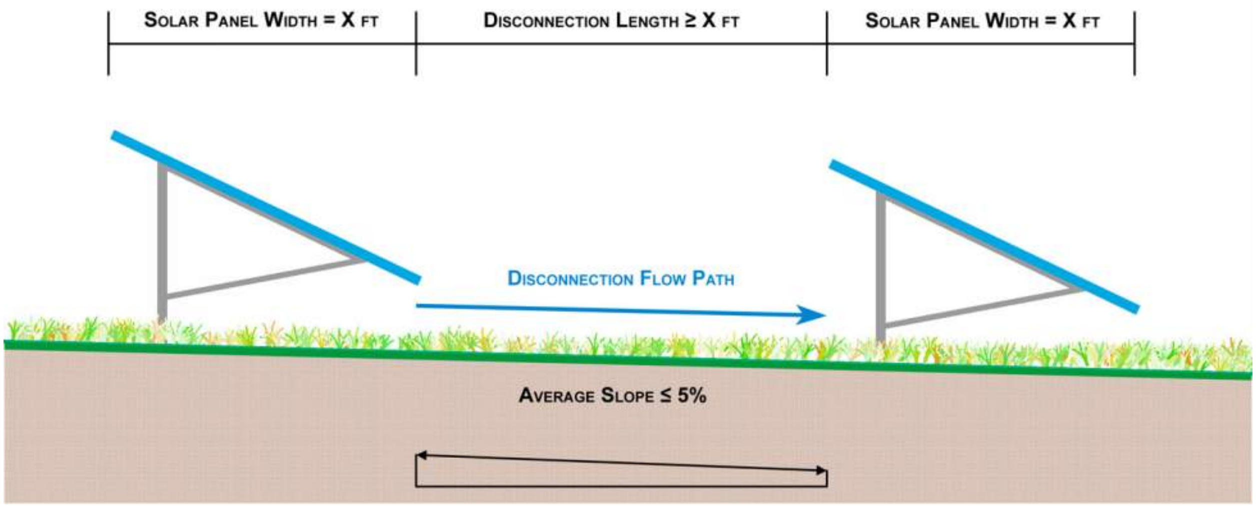



**Figure 1. Typical Installation - Slope ≤ 5%**

**Example 2 – Using Non-Rooftop Disconnection Where the Average Slope ≥ 5% but ≤ 10%**

Several rows of solar panels will be installed in an existing meadow. The soils within the meadow are hydrologic soil group (HSG) B and the average slope is greater than 5% but less than 10%. Each row of panels is 10 feet wide and the distance between rows is 20 feet. The rows of solar panels will be installed as shown in Figure 2 below. The disconnection length is the same as the distance between rows (20 feet) and is greater than the width of each row (10 feet). However, in this example, a level spreader (typically 1 to 2-foot wide and 1 foot deep) has been located at the drip edge of each row of panels to dissipate energy and maintain sheetflow.

**Discussion**

To meet State and local stormwater management requirements, ESD must be used to the MEP to reduce runoff to reflect forested conditions. While all reasonable options for implementing ESD must be investigated, minimally, the runoff from 1 inch of rainfall must be treated. In each of the examples above, there may be additional opportunities to implement ESD techniques or practices and reduce runoff that should be explored. However, simply disconnecting the runoff from the solar panel arrays captures and treats the runoff from 1.0 inch of rainfall. Where imperviousness is low and soil conditions less optimal (e.g., HSG C or D), this may be sufficient to completely address stormwater management requirements. In more dense applications or in sandy soils, additional stormwater management may be required.

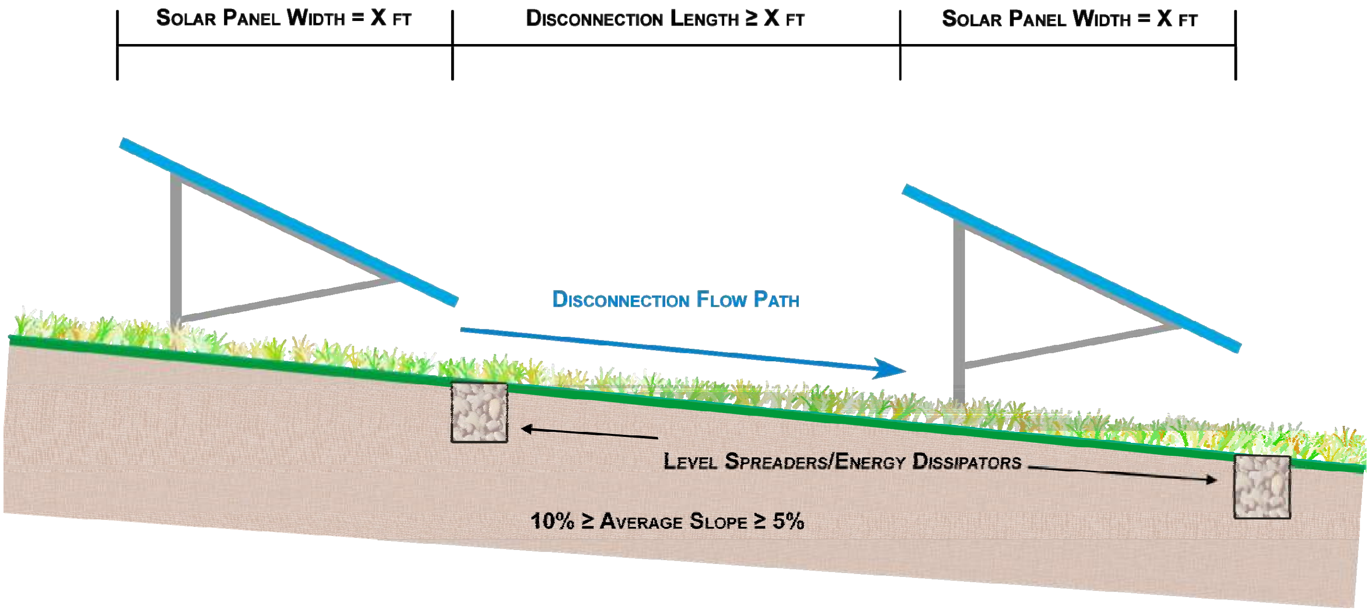



**Figure 2. Typical Installation – Slope ≥ 5% but ≤ 10%**

## Conclusion

The primary purpose of Maryland's stormwater management program is to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources. Any land development project that exceeds 5,000 square feet of disturbance, including solar panel projects, must address stormwater management. However, for solar panels, stormwater management may be provided in a cost-effective manner by disconnecting each row of panels and directing runoff over the vegetated areas between the individual rows.

## Resources

[1] 2000 Maryland Stormwater Design Manual, Volumes I and II, MDE, October 2000 (http://www.mde.state.md.us/programs/Water/StormwaterManagementProgram/MarylandStormwaterDesignManual/Pages/Programs/WaterPrograms/SedimentandStormwater/stormwater_design/index.aspx)

# Appendix J – NYSDEC Limited-Use Pervious Access Road Approval

**From:** Gasper, David J (DEC)
**Sent:** Wednesday, May 22, 2019 9:33 AM
**To:** Adewole, Adedayo J (DEC) <adedayo.adewole@dec.ny.gov>; Banerjee, Dilip K (DEC) <dilip.banerjee@dec.ny.gov>; Barrie, Mary O (DEC) <mary.barrie@dec.ny.gov>; Blum, Tara M (DEC) <tara.blum@dec.ny.gov>; Boyer, Brian C (DEC) <brian.boyer@dec.ny.gov>; Hourigan, Brian (DEC) <brian.hourigan@dec.ny.gov>; Browne, Natalie S (DEC) <natalie.browne@dec.ny.gov>; Buetow, Carrie C (DEC) <carrie.buetow@dec.ny.gov>; Capowski, Robert M (DEC) <robert.capowski@dec.ny.gov>; Carroll, Alyssa D (DEC) <Alyssa.Carroll@dec.ny.gov>; Chiappetta, Christina M (DEC) <Christina.Chiappetta@dec.ny.gov>; Cioffi, Toni (DEC) <toni.cioffi@dec.ny.gov>; Coriale, Richard R (DEC) <richard.coriale@dec.ny.gov>; Cruden, Erica B (DEC) <erica.cruden@dec.ny.gov>; Czajkowski, Katherine M (DEC) <katherine.czajkowski@dec.ny.gov>; DeAngelis, Armand T (DEC) <armand.deangelis@dec.ny.gov>; DiGiulio, Tim (DEC) <tim.digiulio@dec.ny.gov>; Dunlap, Fred (DEC) <fred.dunlap@dec.ny.gov>; Fichter, Adria A (DEC) <adria.fichter@dec.ny.gov>; Fung, Hua J (DEC) <hua.fung@dec.ny.gov>; Gasper, David J (DEC) <david.gasper@dec.ny.gov>; Haas, Cathy (DEC) <cathy.haas@dec.ny.gov>; Hock, John P (DEC) <John.Hock@dec.ny.gov>; Shear, Holly (DEC) <holly.shear@dec.ny.gov>; Hourigan, Brian (DEC) <brian.hourigan@dec.ny.gov>; Howard, Sean M (DEC) <Sean.Howard@dec.ny.gov>; Jangbari, Pradeep (DEC) <pradeep.jangbari@dec.ny.gov>; Johnson, Abigail B (DEC) <Abigail.Johnson@dec.ny.gov>; Kazmierski, Matthew J (DEC) <matthew.kazmierski@dec.ny.gov>; Kim, Eric J (DEC) <Eric.Kim@dec.ny.gov>; Konsella, Jeffrey A (DEC) <jeffrey.konsella@dec.ny.gov>; Lamb-Lafay, Carol (DEC) <carol.lamb-lafay@dec.ny.gov>; Leung, Anthony (DEC) <anthony.leung@dec.ny.gov>; Lints, William J (DEC) <william.lints@dec.ny.gov>; Luce, Andrew (DEC) <andrew.luce@dec.ny.gov>; Malcolm, James E (DEC) <james.malcolm@dec.ny.gov>; Manning, Karis I (DEC) <karis.manning@dec.ny.gov>; McCague, Steven J (DEC) <steven.mccague@dec.ny.gov>; McCullough, Jeffrey B (DEC) <jeffrey.mccullough@dec.ny.gov>; Mcgrath, Kathleen E (DEC) <kathleen.mcgrath@dec.ny.gov>; Melancon, Julie E (DEC) <julie.melancon@dec.ny.gov>; Millar, Lance C (DEC) <lance.millar@dec.ny.gov>; Mitchell, Derek X (DEC) <derek.mitchell@dec.ny.gov>; Mitchell, Rebecca X (DEC) <Rebecca.Mitchell@dec.ny.gov>; Murakami, Tatsuhiko V (DEC) <tatsuhiko.murakami@dec.ny.gov>; Murray, William P (DEC) <william.murray@dec.ny.gov>; Browne, Natalie S (DEC) <natalie.browne@dec.ny.gov>; Porciello, Ryan J (DEC) <Ryan.Porciello@dec.ny.gov>; Pratt, David (DEC) <david.pratt@dec.ny.gov>; Reuther, Julie A (DEC) <Julie.Reuther@dec.ny.gov>; Elburn, Robert H (DEC) <robert.elburn@dec.ny.gov>; Scannell, Luke W (DEC) <luke.scannell@dec.ny.gov>; Zacharias, Sebastian (DEC) <sebastian.zacharias@dec.ny.gov>; Sen, Shyamal Kumar (DEC) <shyamal.sen@dec.ny.gov>; Shear, Holly (DEC) <holly.shear@dec.ny.gov>; Sievers, Chad M (DEC) <chad.sievers@dec.ny.gov>; Smith, Kathryn G (DEC) <kathryn.smith@dec.ny.gov>; Smythe, William (DEC) <william.smythe@dec.ny.gov>; Spadaro, Vincent J (DEC) <vincent.spadaro@dec.ny.gov>; Starr, Bonnie L (DEC) <Bonnie.Starr@dec.ny.gov>; Streeter, Meredith (DEC) <meredith.streeter@dec.ny.gov>; Streeter, Robert (DEC) <robert.streeter@dec.ny.gov>; Sullivan, Ethan R (DEC) <Ethan.Sullivan@dec.ny.gov>; Tamargo, Jonathan R (DEC) <Jonathan.Tamargo@dec.ny.gov>; Thompson, Sevon O (DEC) <sevon.thompson@dec.ny.gov>; Thorsland, Derek T (DEC) <derek.thorsland@dec.ny.gov>; Venne, Tamara (DEC) <tamara.venne@dec.ny.gov>; Vigneault, Thomas M (DEC) <thomas.vigneault@dec.ny.gov>; Waite, Thomas M (DEC) <thomas.waite@dec.ny.gov>; Waldron, Ryan P (DEC) <ryan.waldron@dec.ny.gov>; Smythe, William (DEC) <william.smythe@dec.ny.gov>; Wither, Robert (DEC) <robert.wither@dec.ny.gov>; Zacharias, Sebastian (DEC) <sebastian.zacharias@dec.ny.gov>
**Subject:** Acceptance of TRC's Limited Use Pervious Access Road Detail

FYI - The Department has accepted TRC's "Limited Use, Pervious Access Road Detail" with an "Issued As Final" date of 05/20/19 (see attached). This detail replaces the 10/30/18 version the Department accepted on November 13, 2018.

TRC has given us permission to release the final detail to solar array project owners, design professionals and MS4 officials. Please let me know if you have any questions.

**David Gasper, PE**
Professional Engineer 1, Division of Water

**New York State Department of Environmental Conservation**
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P: (518) 402-8114 | F: (518) 402-9029 | david.gasper@dec.ny.gov
www.dec.ny.gov | |

## GENERAL NOTES:

1. USE OF THIS DETAIL/CRITERION IS LIMITED TO ACCESS ROADS USED ON AN OCCASIONAL BASIS ONLY (I.E. PROVIDE ACCESS FOR MOWING, EQUIPMENT REPAIR OR MAINTENANCE, ETC.).
2. LIMITED USE PERVIOUS ACCESS ROAD IS LIMITED TO LOW IMPACT IRREGULAR MAINTENANCE ACCESS ASSOCIATED WITH RENEWABLE ENERGY PROJECTS IN NEW YORK STATE.
3. REMOVE STUMPS, ROCKS AND DEBRIS AS NECESSARY. FILL VOIDS TO MATCH EXISTING NATIVE SOILS AND COMPACTION LEVEL.
4. REMOVED TOPSOIL MAY BE SPREAD IN ADJACENT AREAS AS DIRECTED BY THE PROJECT ENGINEER. COMPACT TO THE DEGREE OF THE NATIVE INSITU SOIL. DO NOT PLACE IN AN AREA THAT IMPEDES STORMWATER DRAINAGE.
5. GRADE ROADWAY, WHERE NECESSARY, TO NATIVE SOIL AND DESIRED ELEVATION. MINOR GRADING FOR CROSS SLOPE CUT AND FILL MAY BE REQUIRED.
6. REMOVE REFUSE SOILS AS DIRECTED BY THE PROJECT ENGINEER. DO NOT PLACE IN AN AREA THAT IMPEDES STORMWATER DRAINAGE.
7. ROADWAY WIDTH TO BE DETERMINED BY CLIENT.
8. THE LIMITED USE PERVIOUS ACCESS ROAD CROSS SLOPE SHALL BE 2% IN MOST CASES AND SHOULD NOT EXCEED 6%. THE LONGITUDINAL SLOPE OF THE ACCESS DRIVE SHOULD NOT EXCEED 15%.
9. LIMITED USE PERVIOUS ACCESS ROAD IS NOT INTENDED TO BE UTILIZED FOR CONSTRUCTION WHICH MAY SUBJECT THE ACCESS TO SEDIMENT TRACKING. THIS SPECIFICATION IS TO BE DEVELOPED FOR POST-CONSTRUCTION USE. SOIL RESTORATION PRACTICES MAY BE APPLICABLE TO RESTORE CONSTRUCTION RELATED COMPACTION TO PRE-EXISTING CONDITIONS AND SHOULD BE VERIFIED BY SOIL PENETROMETER READINGS. THE PENETROMETER READINGS SHALL BE COMPARED TO THE RESPECTIVE RECORDED READINGS TAKEN PRIOR TO CONSTRUCTION, EVERY 100 LINEAR FEET ALONG THE PROPOSED ROADWAY.
10. TO ENSURE THAT SOIL IS NOT TRACKED ONTO THE LIMITED USE PERVIOUS ACCESS ROAD, IT SHALL NOT BE USED BY CONSTRUCTION VEHICLES TRANSPORTING SOIL, FILL MATERIAL, ETC. IF THE LIMITED USE PERVIOUS ACCESS IS COMPLETED DURING THE INITIAL PHASES OF CONSTRUCTION, A STANDARD NEW YORK STATE STABILIZED CONSTRUCTION ACCESS SHALL BE CONSTRUCTED AND UTILIZED TO REMOVE SEDIMENT FROM CONSTRUCTION VEHICLES AND EQUIPMENT PRIOR TO ENTERING THE LIMITED USE PERVIOUS ACCESS ROAD FROM ANY LOCATION ON, OR OFF SITE. MAINTENANCE OF THE PERVIOUS ACCESS ROAD WILL BE REQUIRED IF SEDIMENT IS OBSERVED WITHIN THE CLEAN STONE.
11. THE LIMITED USE PERVIOUS ACCESS ROAD SHALL NOT BE CONSTRUCTED OR USED UNTIL ALL AREAS SUBJECT TO RUNOFF ONTO THE PERVIOUS ACCESS HAVE ACHIEVED FINAL STABILIZATION.
12. PROJECTS SHOULD AVOID INSTALLATION OF THE LIMITED USE PERVIOUS ACCESS ROAD IN POORLY DRAINED AREAS, HOWEVER IF NO ALTERNATIVE LOCATION IS AVAILABLE, THE PROJECT SHALL UTILIZE WOVEN GEOTEXTILE MATERIAL AS DETAILED IN FOLLOWING NOTES.
13. THE DRAINAGE DITCH IS OFFERED IN THE DETAIL FOR CIRCUMSTANCES WHEN CONCENTRATED FLOW COULD NOT BE AVOIDED. THE INTENTION OF THIS DESIGN IS TO MINIMIZE ALTERATIONS TO HYDROLOGY, HOWEVER WHEN DEALING WITH 5%-15% GRADES NOT PARALLEL TO THE CONTOUR, A ROADSIDE DITCH MAY BE REQUIRED. THE NYS STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROLS FOR GRASSED WATERWAYS AND VEGETATED WATERWAYS ARE APPLICABLE FOR SIZING AND STABILIZATION. DIMENSIONS FOR THE GRASSED WATERWAY SPECIFICATION WOULD BE DESIGNED FOR PROJECT SPECIFIC HYDROLOGIC RUNOFF CALCULATIONS, AND A SEPARATE DETAIL FOR THE SPECIFIC GRASSED WATERWAY WOULD BE INCLUDED IN THIS PRACTICE. RUNOFF DISCHARGES WILL BE SUBJECT TO THE OUTLET REQUIREMENTS OF THE REFERENCED STANDARD. INCREASED POST-DEVELOPMENT RUNOFF FROM THE ASSOCIATED ROADSIDE DITCH MAY REQUIRE ADDITIONAL PRACTICES TO ATTENUATE RUNOFF TO PRE-DEVELOPMENT CONDITIONS.
14. IF A ROADSIDE DITCH IS NOT UTILIZED TO CAPTURE RUNOFF FROM THE ACCESS ROAD, THE PERVIOUS ACCESS ROAD WILL HAVE A WELL-ESTABLISHED PERENNIAL VEGETATIVE COVER, WHICH SHALL CONSIST OF UNIFORM VEGETATION (I.E. BUFFER), 20 FEET WIDE AND PARALLEL TO THE DOWN GRADIENT SIDE OF THE ACCESS ROAD. POST-CONSTRUCTION OPERATION AND MAINTENANCE PRACTICES WILL MAINTAIN THIS VEGETATIVE COVER TO ENSURE FINAL STABILIZATION FOR THE LIFE OF THE ACCESS ROAD.
15. THE DESIGN PROFESSIONAL MUST ACCOUNT FOR THE LIMITED USE PERVIOUS ACCESS ROAD IN THEIR SITE ASSESSMENT/HYDROLOGY ANALYSIS. IF THE HYDROLOGY ANALYSIS SHOWS THAT THE HYDROLOGY HAS BEEN ALTERED FROM PRE- TO POST-DEVELOPMENT CONDITIONS (SEE APPENDIX A OF GP-0-15-002 FOR THE DEFINITION OF "ALTER THE HYDROLOGY..."), THE DESIGN MUST INCLUDE THE NECESSARY DETENTION/RETENTION PRACTICES TO ATTENUATE THE RATES (10 AND 100 YEAR EVENTS) TO PRE-DEVELOPMENT CONDITIONS.

## GEOGRID MATERIAL NOTES:

1. THE GEOGRID, OR COMPARABLE PRODUCT, IS INTENDED FOR USE FOR ALL CONDITIONS, IN ORDER TO ASSIST IN MATERIAL SEPARATION FROM NATIVE SOILS AND PRESERVE ACCESS LOADS.
2. GRAVEL FILL MATERIAL SHALL CONSIST OF 1–4" CLEAN, DURABLE, SHARP-ANGLED CRUSHED STONE OF UNIFORM QUALITY, MEETING THE SPECIFICATIONS OF NYSDOT ITEM 703-02, SIZE DESIGNATION 3-5 OF TABLE 703-4. STONE MAY BE PLACED IN FRONT OF, AND SPREAD WITH, A TRACKED VEHICLE. GRAVEL SHALL NOT BE COMPACTED.
3. GEOGRID SHALL BE MIRAFI BXG110 OR APPROVED EQUAL. GEOGRID SHALL BE DESIGNED BASED ON EXISTING SOIL CONDITIONS AND PROPOSED HAUL ROAD SLOPES.
4. IF MORE THAN ONE ROLL WIDTH IS REQUIRED, ROLLS SHOULD OVERLAP A MINIMUM OF SIX INCHES.
5. REFER TO MANUFACTURER'S SPECIFICATION FOR PROPER TYING AND CONNECTIONS.
6. LIMITED USE PERVIOUS ACCESS ROAD SHALL BE TOP DRESSED AS REQUIRED WITH ONLY 1–4" CRUSHED STONE MEETING NYSDOT ITEM 703-02 SPECIFICATIONS.

BASIS OF DESIGN: TENCATE MIRAFI BXG110 GEOGRIDS; 365 SOUTH HOLLAND DRIVE, PENDERGRASS, GA; 800-685-9990 OR 706-693-2226; WWW.MIRAFI.COM

## GEOWEB MATERIAL NOTES:

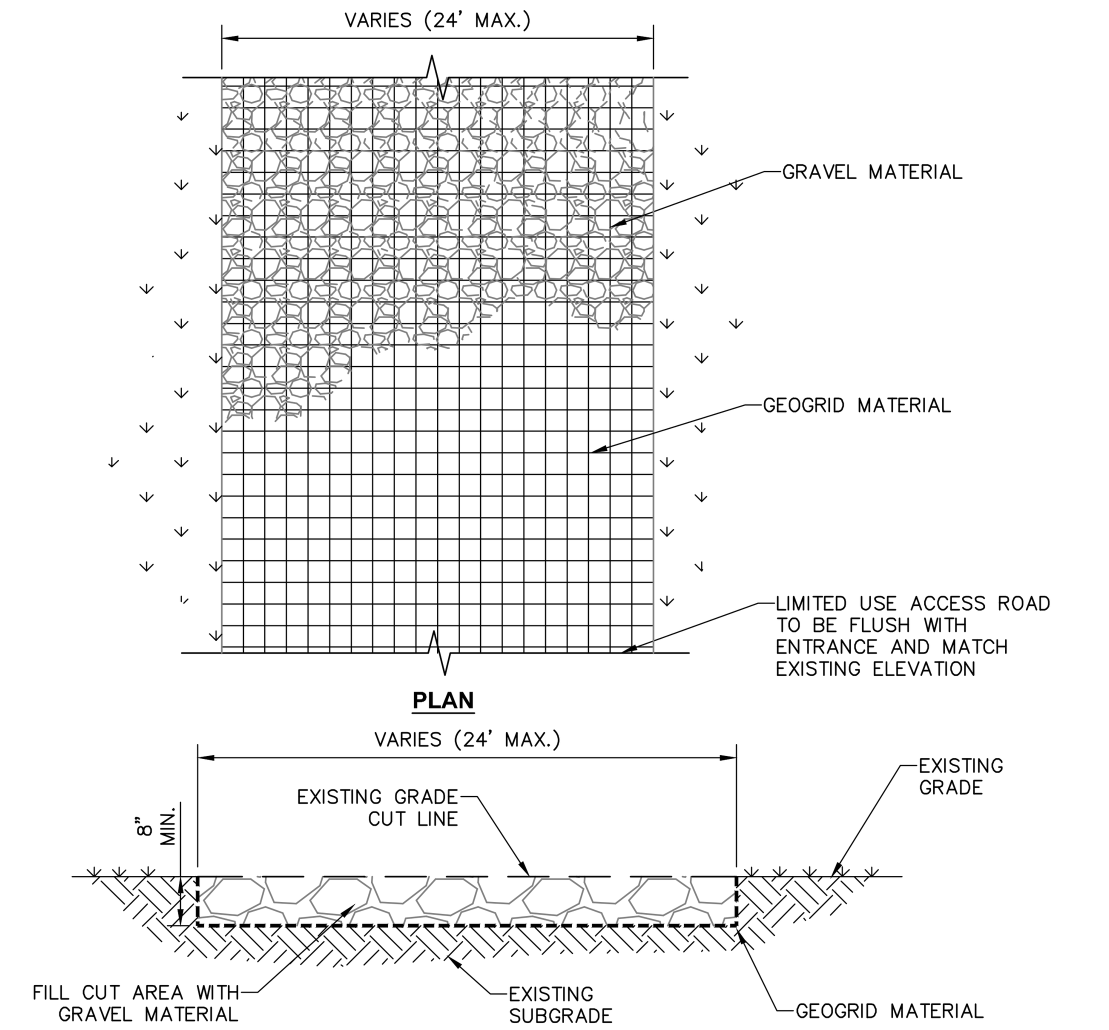
1. THE GEOWEB, OR COMPARABLE PRODUCT, IS SUGGESTED FOR USE ON ROAD PROFILES EXCEEDING 10%. THE GEOWEB PRODUCT IS INTENDED TO LIMIT SHIFTING STONE MATERIAL DURING USE.
2. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
3. WHERE REQUIRED, A NATIVE SOIL WEDGE SHALL BE PLACED TO ACCOMMODATE ROAD CROSS SLOPE OF 2%. NATIVE SOIL SHALL BE COMPACTED TO MATCH EXISTING SOIL CONDITIONS.
4. GRAVEL FILL MATERIAL SHALL CONSIST OF 1–4" CLEAN, DURABLE, SHARP-ANGLED CRUSHED STONE OF UNIFORM QUALITY, MEETING THE SPECIFICATIONS OF NYSDOT ITEM 703-02, SIZE DESIGNATION 3-5 OF TABLE 703-4. STONE MAY BE PLACED IN FRONT OF, AND SPREAD WITH, A TRACKED VEHICLE. GRAVEL SHALL NOT BE COMPACTED.
5. GEOWEB SYSTEM SHALL BE PRESTO GEOSYSTEM GEOWEB OR APPROVED EQUAL. GEOWEB SHALL BE DESIGNED BASED ON EXISTING SOIL CONDITIONS AND PROPOSED HAUL ROAD SLOPES.
6. LIMITED USE PERVIOUS ACCESS ROAD SHALL BE TOP DRESSED AS REQUIRED WITH ONLY 1–4" CRUSHED STONE, SIZE 3A, MEETING NYSDOT ITEM 703-02 SPECIFICATIONS.
7. THE TOP EDGES OF ADJACENT CELL WALLS SHALL BE FLUSH WHEN CONNECTING. ALIGN THE I-SLOTS FOR INTERLEAF AND END TO END CONNECTIONS. THE GEOWEB PANELS SHALL BE CONNECTED WITH ATRA KEYS AT EACH INTERLEAD AND END TO END CONNECTIONS. REFER TO MANUFACTURER'S SPECIFICATION FOR PROPER INSTALLATION, TYING AND CONNECTIONS.

BASIS OF DESIGN: PRESTO GEOSYSTEMS GEOWEB; 670 NORTH PERKINS STREET, APPLETON, WI; 800-548-3424 OR 920-738-1222; INFO@PRESTOGEO.COM; WWW.PRESTOGEO.COM

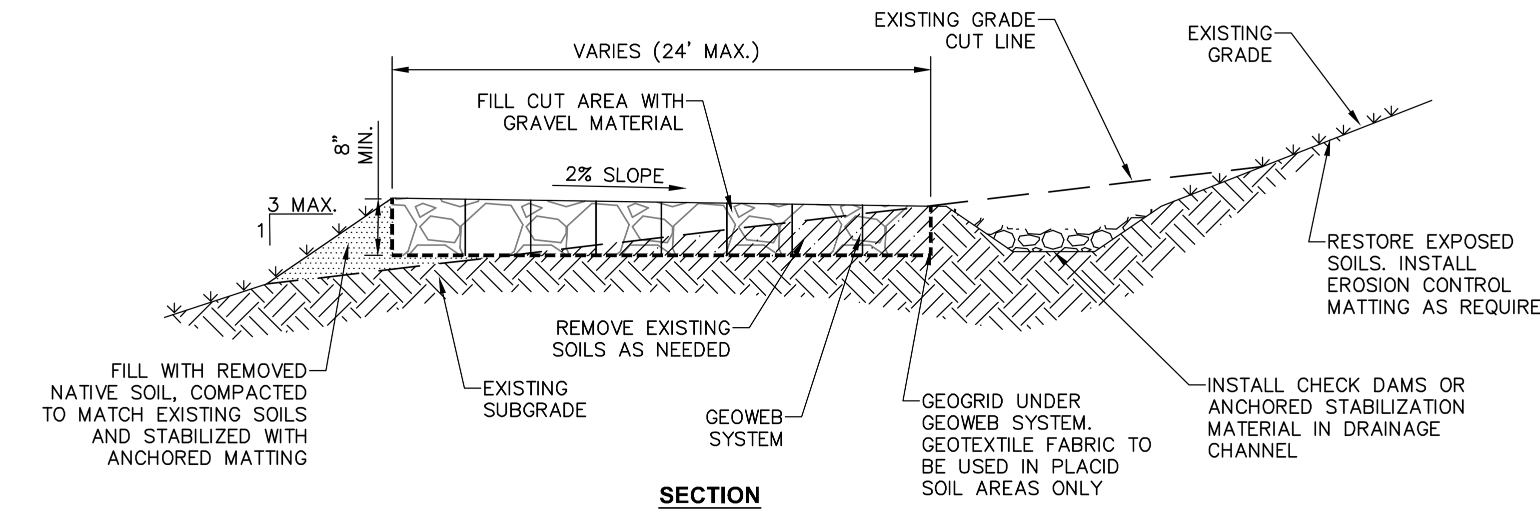
## WOVEN GEOTEXTILE MATERIAL NOTES:

1. SPECIFIED GEOTEXTILE WILL ONLY BE UTILIZED IN PLACID SOILS. PLACID SOILS CONSIST OF POORLY DRAINED SOILS COMPOSED OF FINELY TEXTURED PARTICLES AND ARE PRONE TO RUTTING. PLACID SOILS ARE TYPICALLY PRESENT IN LOW-LYING AREAS WITH HYDROLOGIC SOILS GROUP (HSG) OF C OR D, OR AS SPCIFIED FROM AN ENVIRONMENTAL SCIENTIST, SOIL SCIENTIST, OR GEOTECHNICAL DATA.
2. THE CONCERN FOR POTENTIAL REDUCTION OF NATIVE INFILTRATION RATES DUE TO THE GEOTEXTILE MATERIAL WOULD NOT BE A SIGNIFICANT CONCERN IN POORLY DRAINED SOILS WHERE SEGREGATION OF PERVIOUS STONE AND NATIVE MATERIALS IS CRUCIAL FOR LONG TERM OPERATION AND MAINTENANCE.

BASIS OF DESIGN: TENCATE MIRAFI RSi-SERIES WOVEN GEOSYNTHETICS; 365 SOUTH HOLLAND DRIVE, PENDERGRASS, GA; 800-685-9990 OR 706-693-2226; WWW.MIRAFI.COM



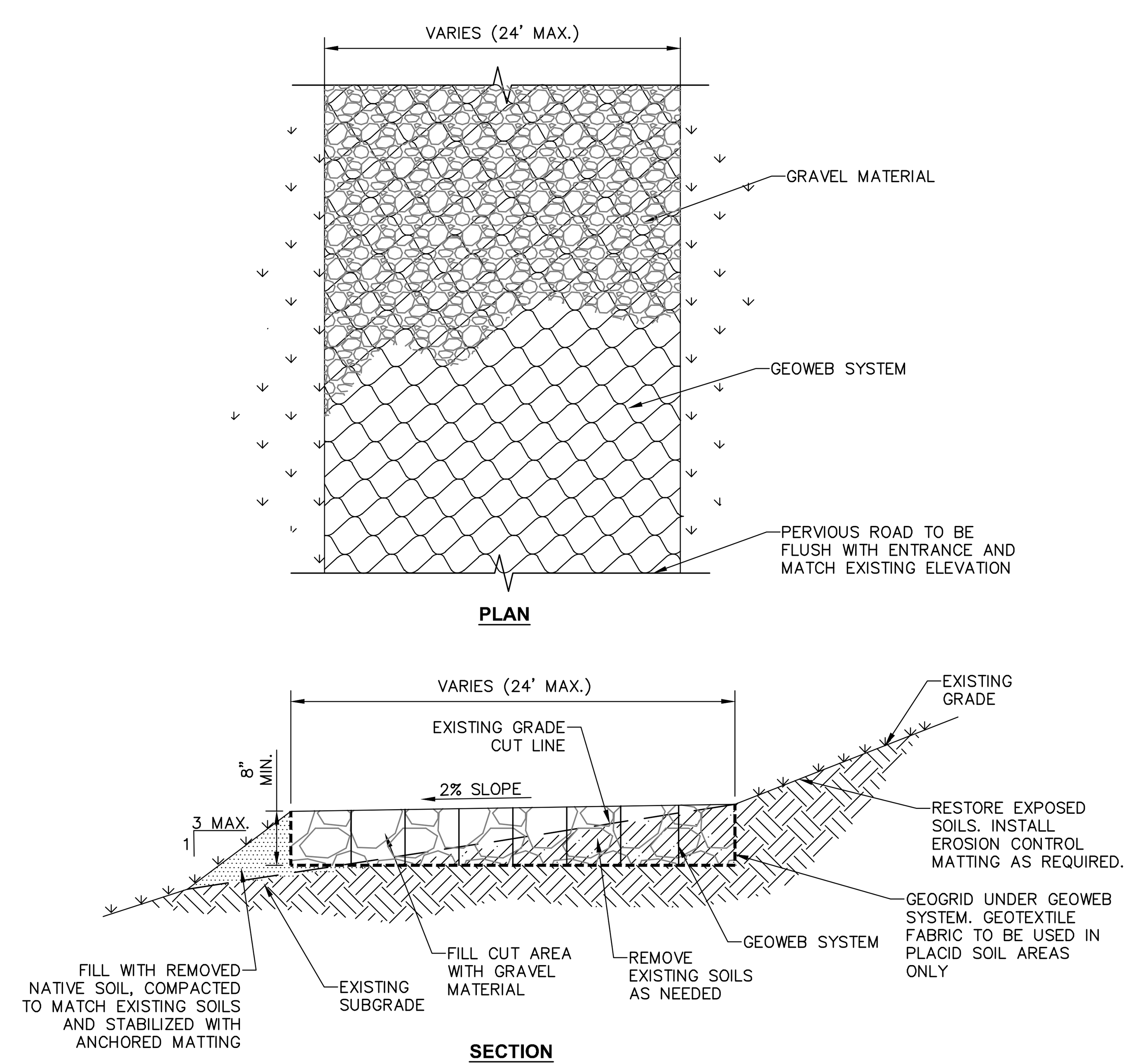

### 1 LIMITED USE PERVIOUS ACCESS ROAD - 0% TO 10% SLOPES
SCALE: N.T.S.



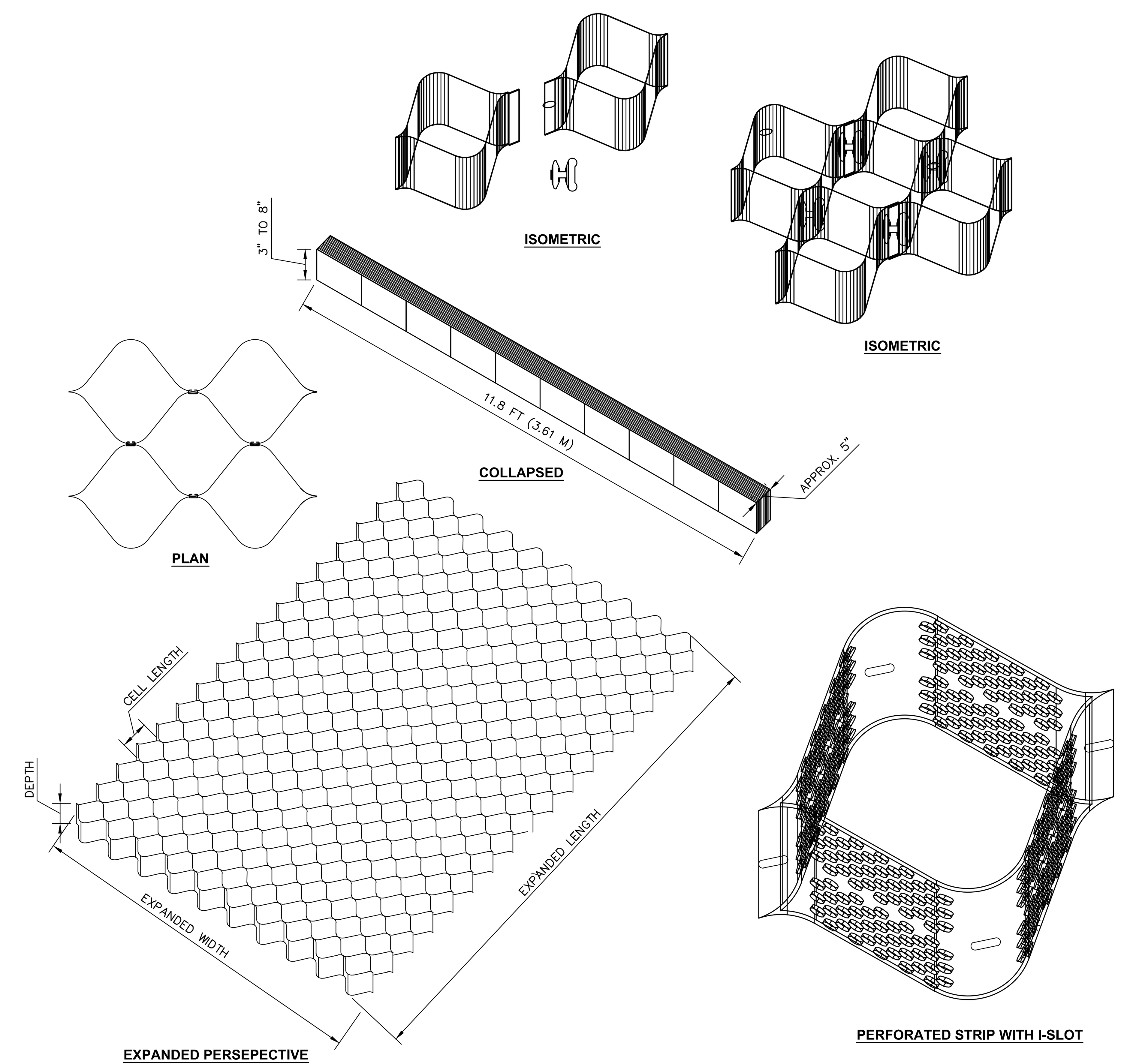

**NOTE:**

1. THE ROADSIDE DITCH SHALL BE DESIGNED IN ACCORDANCE WITH THE NEW YORK STATE STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROLS FOR GRASSED AND VEGETATED WATERWAYS. ADDITIONAL DETAILS WILL BE PROVIDED SPECIFIC TO THE SITE DESIGN.

### 2 LIMITED USE PERVIOUS ACCESS ROAD - 10% AND GREATER SLOPES WITH DITCH
SCALE: N.T.S.




### 3 LIMITED USE PERVIOUS ACCESS ROAD - 10% AND GREATER SLOPES
SCALE: N.T.S.




### 4 GEOWEB SYSTEM
SCALE: N.T.S.

| NO. | REVISION | DATE |
|---|---|---|
| 1 | ISSUED AS FINAL | 05/20/2019 |

Client

TRC

TRC Engineers, Inc.
215 Greenfield Parkway
Liverpool, NY 13088

www.trccompanies.com

DRAWING TITLE:

LIMITED USE PERVIOUS ACCESS ROAD DETAIL

| | |
|---|---|
| SCALE: | N.T.S. |
| DATE: | 05/17/2019 |
| DRAWN BY: | CAK |
| CHECKED BY: | SML |
| PROJECT: | |
| DRAWING NO.: | |

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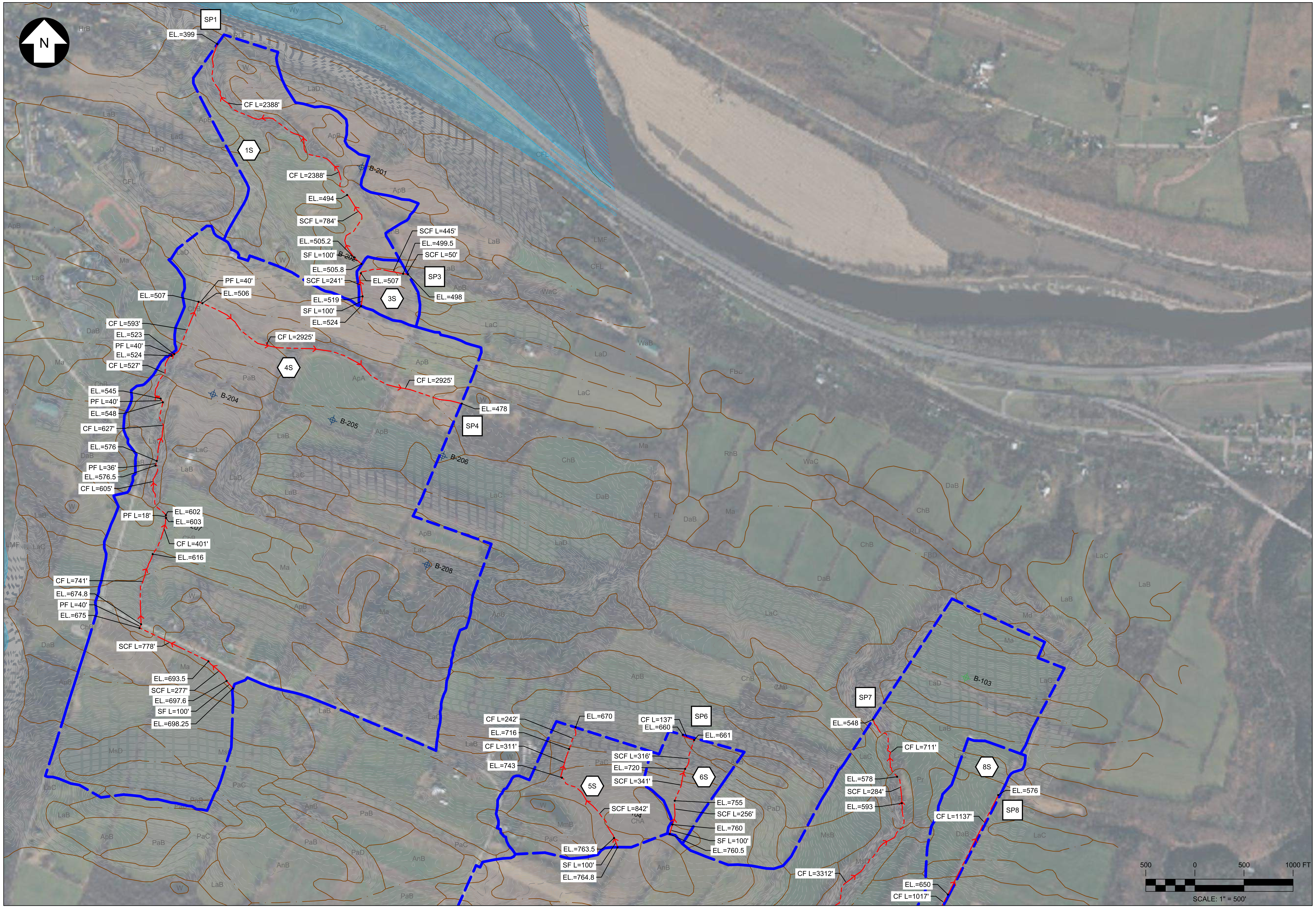
# Appendix K – Pre-Development Modeling

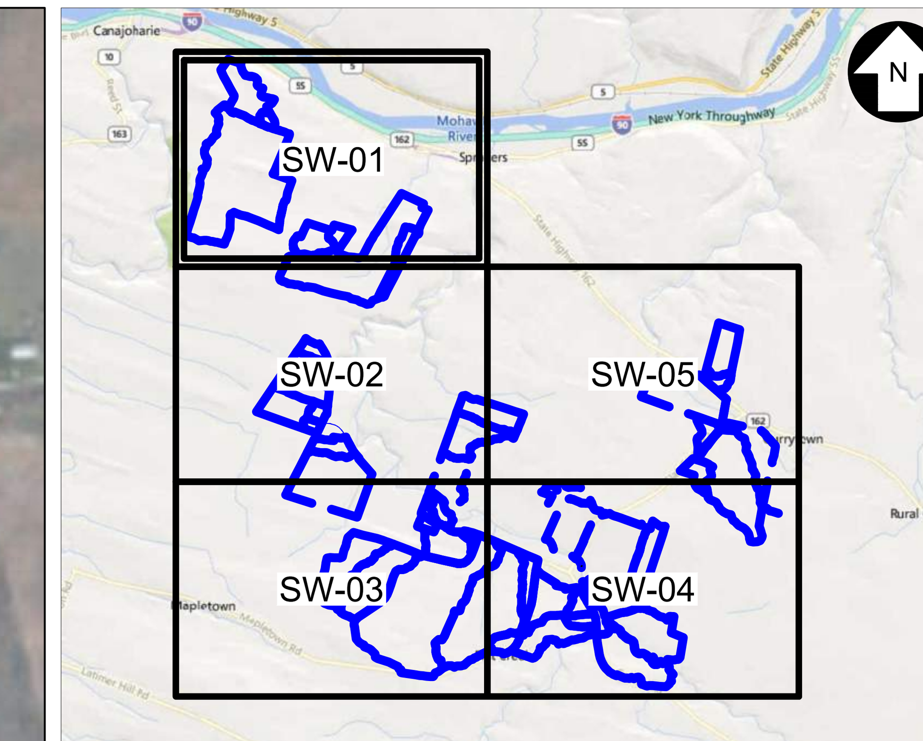
- Pre-Development Subcatchment Map -

- Pre-Development HydroCAD Model -

Note: Documents provided in this Appendix are preliminary and will be amended and finalized for the Final SWPPP prior to construction.

# Appendix K – Pre-Development Subcatchment Map




## LOCATION MAP

N.T.S.

## LEGEND

| | |
|---|---|
| 1P | POND |
| 1R | REACH |
| 1S | SUBCATCHMENT |
| | PROPERTY BOUNDARY |
| | TC FLOW |
| | SUBCATCHMENT BOUNDARY |
| | SOILS |
| | VERNAL POOL |

PRELIMINARY
NOT FOR CONSTRUCTION

TRC — 249 Western Avenue, Augusta, ME 04330

CORDELIO POWER — SUITE 1805 - 55 FIFTH AVE, NEW YORK, NY 10003

PROJECT NO: 435979

| REV | DESCRIPTION | DATE | DES | CHK | APP |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| A | ISSUED FOR ORES 94C REVIEW | 07/12/2024 | TRC | TRC | TRC |

| | |
|---|---|
| DESIGNED | ZG |
| DRAWN | ZG |
| CHECKED | PT |
| APPROVED | |
| REVIEW 1 | |
| REVIEW 2 | |

FLAT CREEK SOLAR PROJECT
CORDELIO POWER LP
STORMWATER MAP
PRE-DEVELOPMENT

ROOT/CANAJOHARIE — NEW YORK

DATE: 07/12/2024
SCALE: 1"=500'

SW-01

REV. A


TRC
249 Western Avenue
Augusta, ME 04330

CORDELIO POWER
SUITE 1805 - 55 FIFTH AVE
NEW YORK, NY 10003
PROJECT NO: 435979

| REV | DESCRIPTION | DATE | DES | CHK | APP |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| A | ISSUED FOR ORES 94C REVIEW | 07/12/2024 | TRC | TRC | TRC |

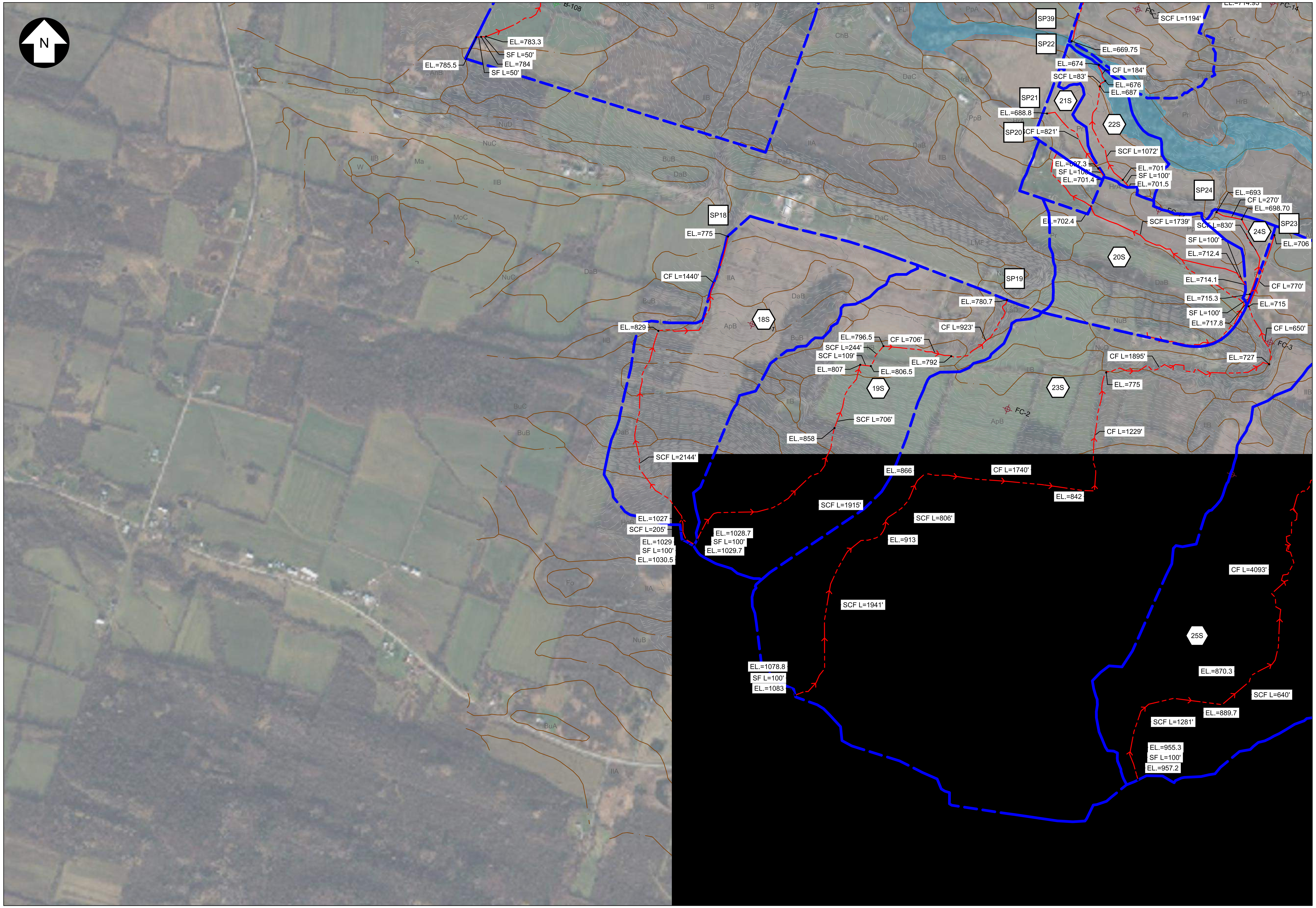
ZG DESIGNED
ZG DRAWN
PT CHECKED
APPROVED
REVIEW 1
REVIEW 2

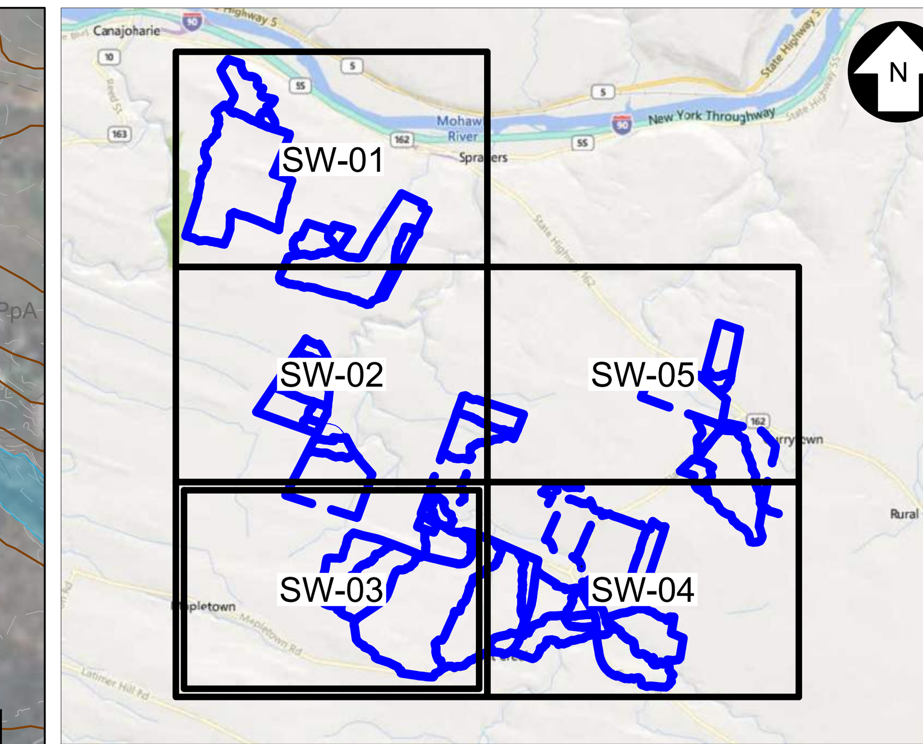
FLAT CREEK SOLAR PROJECT
CORDELIO POWER LP
STORMWATER MAP
PRE-DEVELOPMENT
ROOT/CANAJOHARIE NEW YORK

07/12/2024 DATE
1"=500' SCALE
TRC
SW-02
REV. A

Call 811 before you dig

PRELIMINARY
NOT FOR CONSTRUCTION




## LOCATION MAP

N.T.S.

## LEGEND

- 1P — POND
- 1R — REACH
- 1S — SUBCATCHMENT
- PROPERTY BOUNDARY
- TC FLOW
- SUBCATCHMENT BOUNDARY
- SOILS
- VERNAL POOL

PRELIMINARY
NOT FOR CONSTRUCTION

TRC
249 Western Avenue
Augusta, ME 04330

CORDELIO POWER
SUITE 1805 - 55 FIFTH AVE
NEW YORK, NY 10003
PROJECT NO: 435979

| REV | DESCRIPTION | DATE | DES | CHK | APP |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| A | ISSUED FOR ORES 94C REVIEW | 07/12/2024 | TRC | TRC | TRC |

ZG DESIGNED
ZG DRAWN
PT CHECKED
APPROVED
REVIEW 1
REVIEW 2

FLAT CREEK SOLAR PROJECT
CORDELIO POWER LP
STORMWATER MAP
PRE-DEVELOPMENT

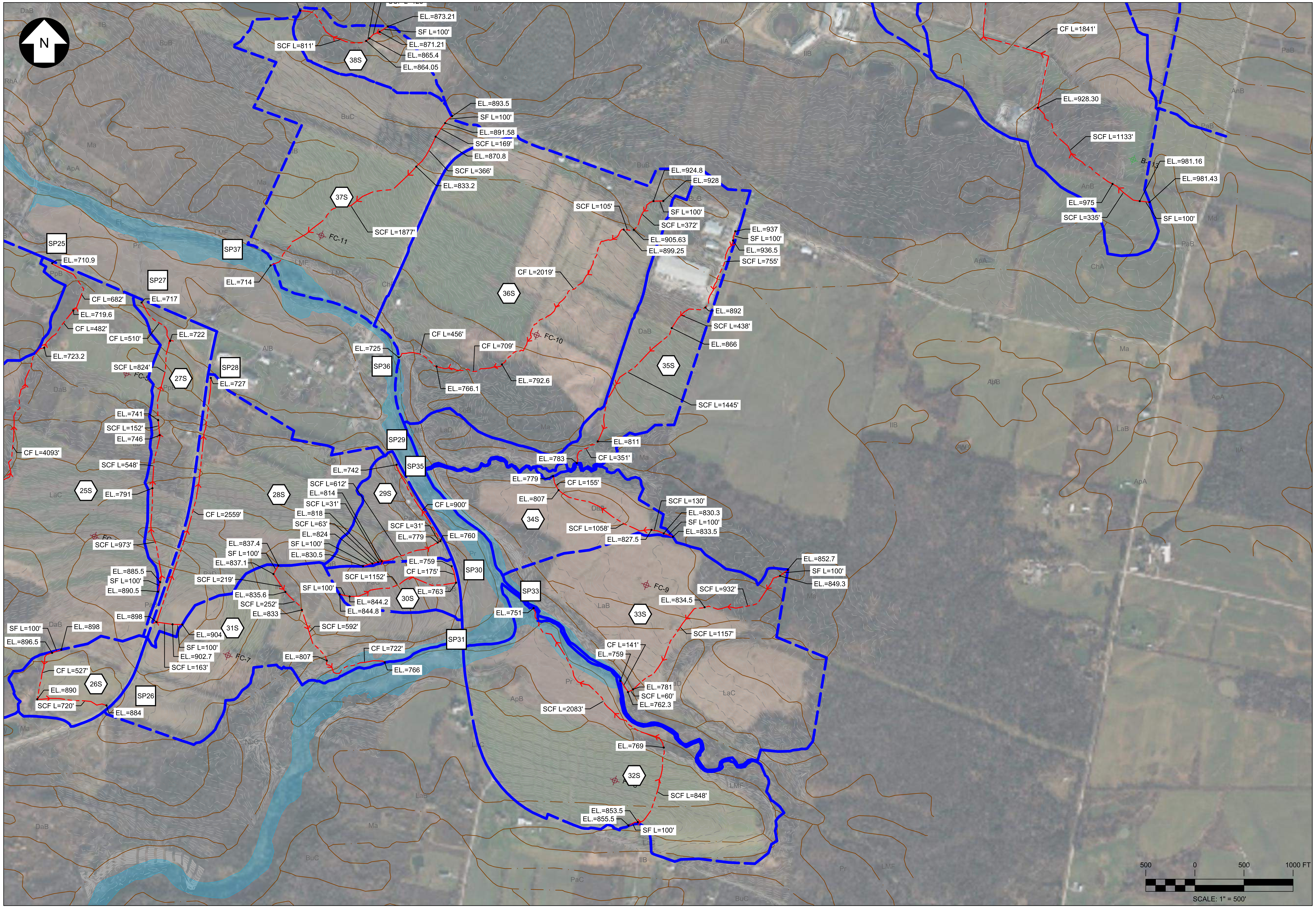
ROOT/CANAJOHARIE — NEW YORK

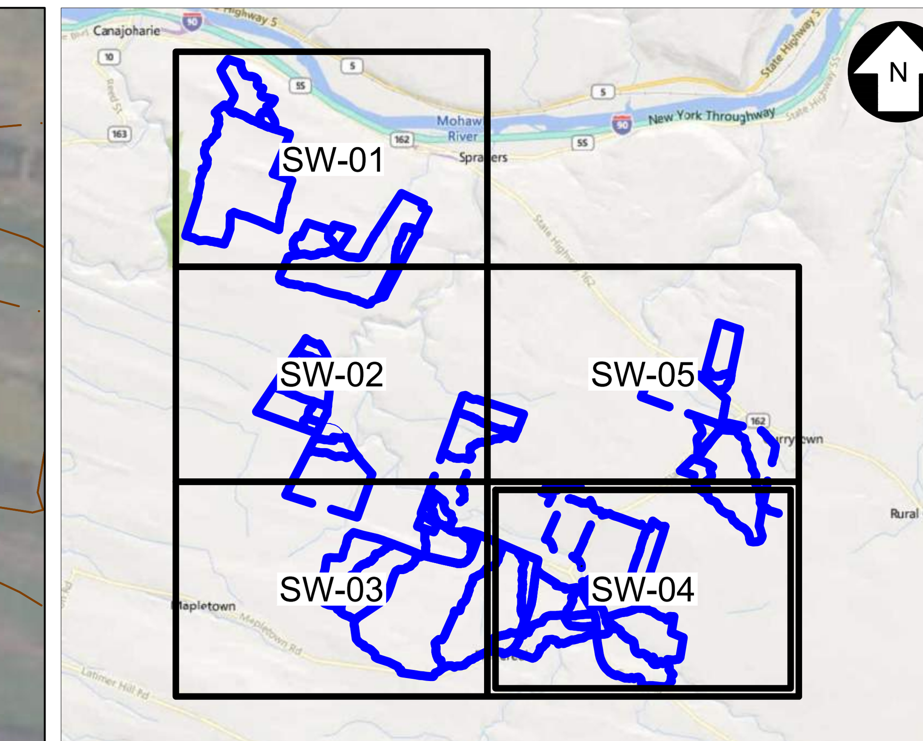
07/12/2024 DATE
1"=500' SCALE

TRC

SW-03

REV. A




LOCATION MAP
N.T.S.

## LEGEND

- 1P — POND
- 1R — REACH
- 1S — SUBCATCHMENT
- PROPERTY BOUNDARY
- TC FLOW
- SUBCATCHMENT BOUNDARY
- SOILS
- VERNAL POOL

Call811 before you dig

PRELIMINARY
NOT FOR CONSTRUCTION

TRC
249 Western Avenue
Augusta, ME 04330

CORDELIO POWER
SUITE 1805 - 55 FIFTH AVE
NEW YORK, NY 10003
PROJECT NO: 435979

| REV | DESCRIPTION | DATE | DES | CHK | APP |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| A | ISSUED FOR ORES 94C REVIEW | 07/12/2024 | TRC | TRC | TRC |

ZG DESIGNED
ZG DRAWN
PT CHECKED
APPROVED
REVIEW 1
REVIEW 2

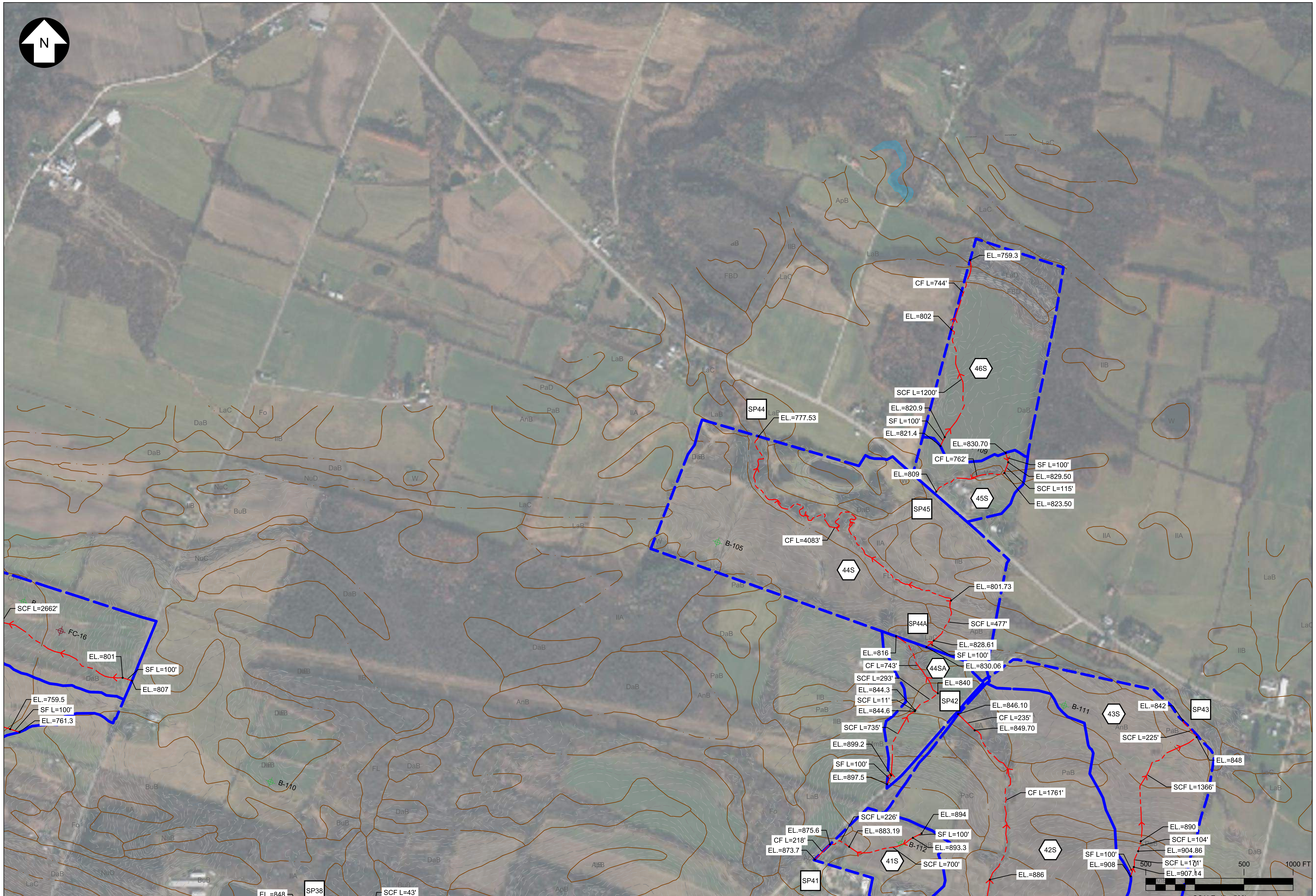
FLAT CREEK SOLAR PROJECT
CORDELIO POWER LP
STORMWATER MAP
PRE-DEVELOPMENT
ROOT/CANAJOHARIE NEW YORK

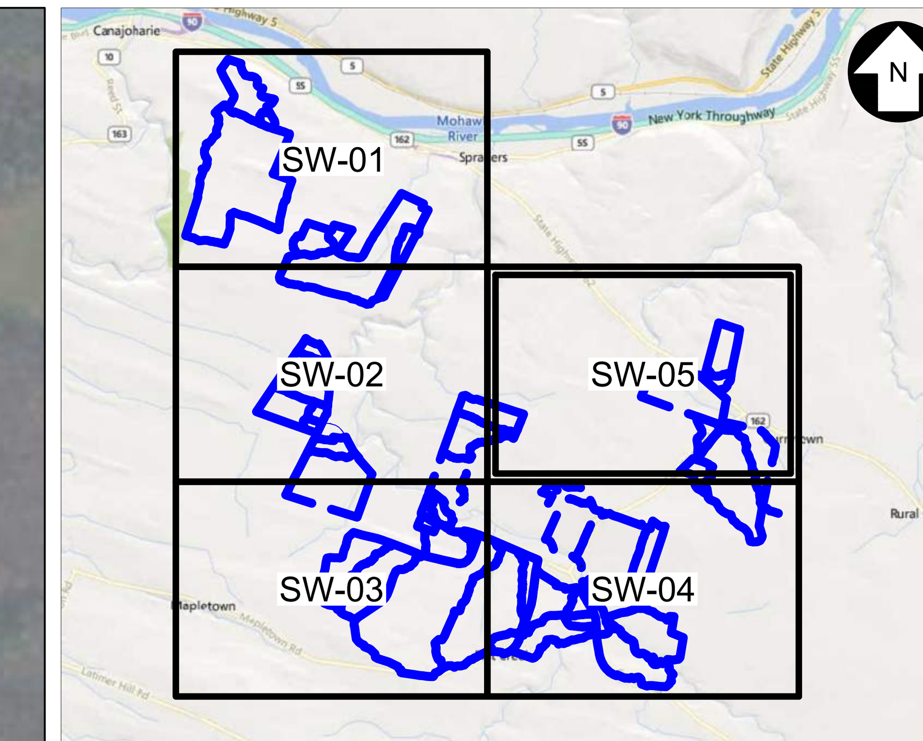
07/12/2024 DATE
1"=500' SCALE

TRC

SW-04

REV. A




LOCATION MAP

N.T.S.

## LEGEND

| | |
| --- | --- |
| 1P | POND |
| 1R | REACH |
| 1S | SUBCATCHMENT |
| | PROPERTY BOUNDARY |
| | TC FLOW |
| | SUBCATCHMENT BOUNDARY |
| | SOILS |
| | VERNAL POOL |

PRELIMINARY
NOT FOR CONSTRUCTION

TRC
249 Western Avenue
Augusta, ME 04330

CORDELIO POWER
SUITE 1805 - 55 FIFTH AVE
NEW YORK, NY 10003
PROJECT NO: 435979

| REV | DESCRIPTION | DATE | DES | CHK | APP |
| --- | --- | --- | --- | --- | --- |
| | | | | | |
| | | | | | |
| | | | | | |
| A | ISSUED FOR ORES 94C REVIEW | 07/12/2024 | TRC | TRC | TRC |

DESIGNED: ZG
DRAWN: ZG
CHECKED: PT
APPROVED:
REVIEW 1:
REVIEW 2:

FLAT CREEK SOLAR PROJECT
CORDELIO POWER LP
STORMWATER MAP
PRE-DEVELOPMENT

ROOT/CANAJOHARIE — NEW YORK

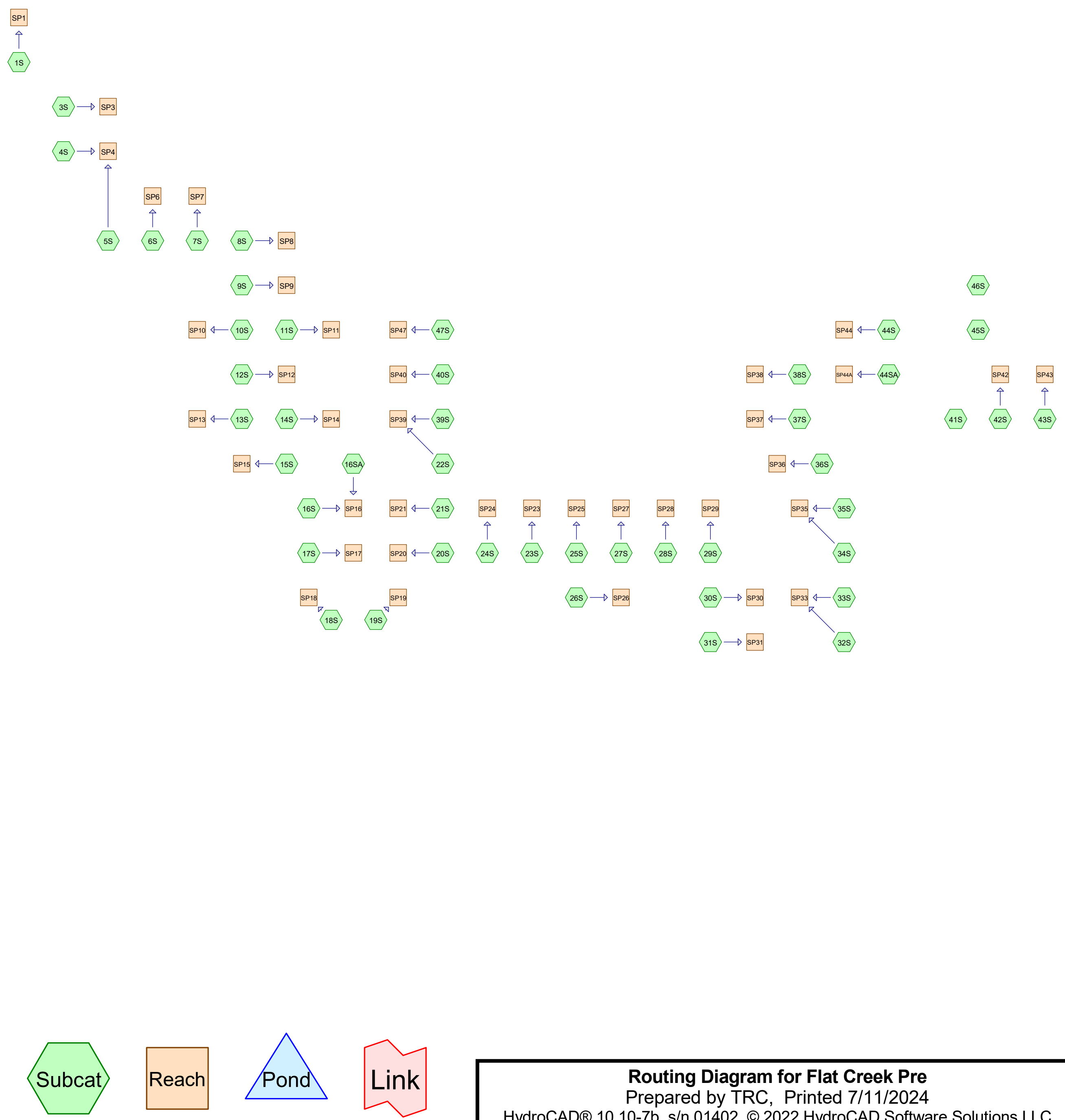
DATE: 07/12/2024
SCALE: 1"=500'

TRC

SW-05

REV. A

# Appendix K – Pre-Development HydroCAD Model




**Routing Diagram for Flat Creek Pre**
Prepared by TRC, Printed 7/11/2024
HydroCAD® 10.10-7b s/n 01402 © 2022 HydroCAD Software Solutions LLC

## Rainfall Events Listing

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|---|---|---|---|---|---|---|---|---|
| 1 | 1-yr | Type II 24-hr | | Default | 24.00 | 1 | 2.04 | 2 |
| 2 | 10-yr | Type II 24-hr | | Default | 24.00 | 1 | 3.42 | 2 |
| 3 | 25-yr | Type II 24-hr | | Default | 24.00 | 1 | 4.07 | 2 |
| 4 | 100-yr | Type II 24-hr | | Default | 24.00 | 1 | 5.07 | 2 |

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.768 | 61 | >75% Grass cover, Good, HSG B (41S) |
| 0.155 | 74 | >75% Grass cover, Good, HSG C (41S) |
| 0.284 | 30 | Brush, Good, HSG A (21S, 39S) |
| 4.083 | 48 | Brush, Good, HSG B (1S, 4S, 5S, 7S, 9S, 10S, 13S, 14S, 15S, 16SA, 19S, 25S, 27S, 28S, 29S, 32S, 34S, 36S, 37S, 44SA) |
| 8.589 | 65 | Brush, Good, HSG C (6S, 7S, 8S, 17S, 21S, 22S, 23S, 27S, 28S, 29S, 32S, 42S) |
| 75.859 | 73 | Brush, Good, HSG D (1S, 3S, 4S, 5S, 6S, 7S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 22S, 23S, 24S, 25S, 27S, 28S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 39S, 40S, 42S, 44S, 44SA, 45S, 46S, 47S) |
| 3.005 | 96 | Gravel (4S, 5S, 7S, 8S, 29S, 39S, 41S, 44S, 44SA, 45S, 47S) |
| 4.976 | 96 | Gravel surface, HSG A (19S, 20S, 27S, 32S, 37S, 42S) |
| 3.124 | 96 | Gravel surface, HSG D (23S, 25S, 35S, 36S) |
| 7.571 | 98 | Impervious (7S, 12S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 37S, 41S, 43S, 44S, 44SA, 45S, 47S) |
| 8.790 | 98 | Impervious Pavement (1S, 4S, 5S, 8S, 9S, 26S, 29S, 39S, 40S) |
| 1.302 | 98 | Impervious Roof (4S, 5S, 8S, 29S) |
| 2.220 | 98 | Impervious Surface (28S, 30S, 31S, 32S) |
| 11.500 | 30 | Meadow, non-grazed, HSG A (20S, 21S, 22S, 23S, 27S, 39S) |
| 385.599 | 58 | Meadow, non-grazed, HSG B (1S, 3S, 4S, 5S, 7S, 8S, 9S, 10S, 12S, 13S, 14S, 15S, 16SA, 18S, 19S, 20S, 25S, 27S, 28S, 29S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 41S, 44S, 44SA) |
| 313.074 | 71 | Meadow, non-grazed, HSG C (4S, 5S, 6S, 7S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 35S, 36S, 39S, 41S, 42S, 43S, 44S, 44SA) |
| 1,881.769 | 78 | Meadow, non-grazed, HSG D (1S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 41S, 42S, 43S, 44S, 44SA, 45S, 46S, 47S) |
| 0.410 | 98 | Paved parking, HSG D (11S) |
| 1.856 | 98 | Paved roads w/curbs & sewers, HSG A (21S, 22S, 27S) |
| 10.727 | 98 | Paved roads w/curbs & sewers, HSG D (23S, 24S, 25S, 35S, 36S) |
| 7.148 | 98 | Water (4S, 5S, 9S, 26S, 37S, 44S, 44SA, 45S) |
| 1.438 | 98 | Water Surface, HSG A (17S, 18S, 20S, 42S) |
| 2.690 | 30 | Woods, Good, HSG A (21S, 22S, 27S, 39S) |
| 124.384 | 55 | Woods, Good, HSG B (1S, 3S, 4S, 5S, 7S, 8S, 9S, 10S, 13S, 15S, 18S, 19S, 20S, 25S, 27S, 28S, 29S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 41S, 44S, 44SA, 46S) |
| 87.844 | 70 | Woods, Good, HSG C (4S, 5S, 6S, 7S, 16S, 17S, 18S, 19S, 20S, 22S, 23S, 27S, 28S, 29S, 30S, 31S, 32S, 35S, 36S, 37S, 39S, 41S, 42S, 43S, 44S, 44SA) |
| 539.268 | 77 | Woods, Good, HSG D (1S, 3S, 4S, 5S, 6S, 7S, 8S, 10S, 12S, 13S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 42S, 43S, 44S, 44SA, 45S, 46S, 47S) |

## Area Listing (all nodes) (continued)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| **3,488.434** | **74** | **TOTAL AREA** |

## Soil Listing (all nodes)

| Area (acres) | Soil Group | Subcatchment Numbers |
|---|---|---|
| 22.744 | HSG A | 17S, 18S, 19S, 20S, 21S, 22S, 23S, 27S, 32S, 37S, 39S, 42S |
| 514.835 | HSG B | 1S, 3S, 4S, 5S, 7S, 8S, 9S, 10S, 12S, 13S, 14S, 15S, 16SA, 18S, 19S, 20S, 25S, 27S, 28S, 29S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 41S, 44S, 44SA, 46S |
| 409.661 | HSG C | 4S, 5S, 6S, 7S, 8S, 16S, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 35S, 36S, 37S, 39S, 41S, 42S, 43S, 44S, 44SA |
| 2,511.158 | HSG D | 1S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S, 32S, 33S, 34S, 35S, 36S, 37S, 38S, 39S, 40S, 41S, 42S, 43S, 44S, 44SA, 45S, 46S, 47S |
| 30.036 | Other | 1S, 4S, 5S, 7S, 8S, 9S, 12S, 14S, 15S, 16S, 16SA, 17S, 18S, 19S, 20S, 26S, 28S, 29S, 30S, 31S, 32S, 37S, 39S, 40S, 41S, 43S, 44S, 44SA, 45S, 47S |
| **3,488.434** | | **TOTAL AREA** |

## Ground Covers (all nodes)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.768 | 0.155 | 0.000 | 0.000 | 0.923 | >75% Grass cover, Good | 41 S |
| 0.284 | 4.083 | 8.589 | 75.859 | 0.000 | 88.816 | Brush, Good | 1S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10 S, 11 S, 12 S, 13 S, 14 S, 15 S, 16 S, 16 SA, 17 S, 18 S, 19 S, 20 S, 21 S, 22 |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.000 | 3.005 | 3.005 | Gravel | 4S, 5S, 7S, 8S, 29 S, 39 S, 41 S, 44 S, 44 SA, 45 S, 47 S |
| 4.976 | 0.000 | 0.000 | 3.124 | 0.000 | 8.100 | Gravel surface | 19 S, 20 S, 23 S, 25 S, 27 S, 32 S, 35 S, 36 S, 37 S, 42 S |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.000 | 7.571 | 7.571 | Impervious | 7S, 12 S, 14 S, 15 S, 16 S, 16 SA, 17 S, 18 S, 19 S, 20 S, 37 S, 41 S, 43 S, 44 S, 44 SA, 45 S, 47 S |
| 0.000 | 0.000 | 0.000 | 0.000 | 8.790 | 8.790 | Impervious Pavement | 1S, 4S, 5S, 8S, 9S, |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.000 | 1.302 | 1.302 | Impervious Roof | 4S, 5S, 8S, 29S |
| 0.000 | 0.000 | 0.000 | 0.000 | 2.220 | 2.220 | Impervious Surface | 28S, 30S, 31S, 32S |
| 11.500 | 385.599 | 313.074 | 1,881.769 | 0.000 | 2,591.942 | Meadow, non-grazed | 1S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.410 | 0.000 | 0.410 | Paved parking | 11S |
| 1.856 | 0.000 | 0.000 | 10.727 | 0.000 | 12.583 | Paved roads w/curbs & sewers | 21S, 22S, 23S, 24S, 25S, 27S, 35S, 36S |
| 0.000 | 0.000 | 0.000 | 0.000 | 7.148 | 7.148 | Water | 4S, 5S, 9S, 26S, 37S, 44S, 44SA, 45S |
| 1.438 | 0.000 | 0.000 | 0.000 | 0.000 | 1.438 | Water Surface | 17S, 18S, 20S, 42S |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| 2.690 | 124.384 | 87.844 | 539.268 | 0.000 | 754.186 | Woods, Good | 1S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10 S, 12 S, 13 S, 14 S, 15 S, 16 S, 16 SA, 17 S, 18 S, 19 S, 20 S, 21 S, 22 S, 23 S, 24 |

## Ground Covers (all nodes) (continued)

| HSG-A (acres) | HSG-B (acres) | HSG-C (acres) | HSG-D (acres) | Other (acres) | Total (acres) | Ground Cover | Subcatchment Numbers |
|---|---|---|---|---|---|---|---|
| **22.744** | **514.835** | **409.661** | **2,511.158** | **30.036** | **3,488.434** | **TOTAL AREA** | |

## Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 4S | 0.00 | 0.00 | 40.0 | 0.0050 | 0.025 | 0.0 | 24.0 | 0.0 |
| 2 | 4S | 0.00 | 0.00 | 18.0 | 0.0560 | 0.025 | 0.0 | 24.0 | 0.0 |
| 3 | 4S | 0.00 | 0.00 | 36.0 | 0.0140 | 0.025 | 0.0 | 24.0 | 0.0 |
| 4 | 4S | 0.00 | 0.00 | 40.0 | 0.0750 | 0.025 | 0.0 | 24.0 | 0.0 |
| 5 | 4S | 0.00 | 0.00 | 40.0 | 0.0250 | 0.025 | 0.0 | 12.0 | 0.0 |
| 6 | 4S | 0.00 | 0.00 | 40.0 | 0.0250 | 0.025 | 0.0 | 30.0 | 0.0 |

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,020,873 sf 2.29% Impervious Runoff Depth=0.15"
Flow Length=3,272' Tc=52.0 min CN=65 Runoff=2.37 cfs 0.844 af

**Subcatchment 3S:** Runoff Area=324,754 sf 0.00% Impervious Runoff Depth=0.13"
Flow Length=836' Tc=23.1 min CN=64 Runoff=0.27 cfs 0.080 af

**Subcatchment 4S:** Runoff Area=16,260,538 sf 1.60% Impervious Runoff Depth=0.26"
Flow Length=7,788' Tc=76.3 min CN=70 Runoff=26.54 cfs 7.959 af

**Subcatchment 5S:** Runoff Area=1,679,234 sf 4.90% Impervious Runoff Depth=0.34"
Flow Length=1,495' Tc=34.3 min CN=73 Runoff=7.29 cfs 1.087 af

**Subcatchment 6S:** Runoff Area=598,623 sf 0.00% Impervious Runoff Depth=0.31"
Flow Length=1,150' Tc=39.7 min CN=72 Runoff=2.03 cfs 0.354 af

**Subcatchment 7S:** Runoff Area=10,734,763 sf 0.11% Impervious Runoff Depth=0.26"
Flow Length=6,505' Tc=76.1 min CN=70 Runoff=17.50 cfs 5.254 af

**Subcatchment 8S:** Runoff Area=1,124,521 sf 2.07% Impervious Runoff Depth=0.28"
Flow Length=2,618' Tc=29.5 min CN=71 Runoff=4.04 cfs 0.606 af

**Subcatchment 9S:** Runoff Area=698,860 sf 9.80% Impervious Runoff Depth=0.43"
Flow Length=1,212' Tc=81.2 min CN=76 Runoff=2.35 cfs 0.581 af

**Subcatchment 10S:** Runoff Area=1,561,270 sf 0.00% Impervious Runoff Depth=0.43"
Flow Length=2,211' Tc=88.4 min CN=76 Runoff=4.95 cfs 1.298 af

**Subcatchment 11S:** Runoff Area=521,344 sf 3.42% Impervious Runoff Depth=0.55"
Flow Length=1,039' Tc=43.1 min CN=79 Runoff=3.85 cfs 0.545 af

**Subcatchment 12S:** Runoff Area=1,437,516 sf 0.62% Impervious Runoff Depth=0.51"
Flow Length=2,388' Tc=104.6 min CN=78 Runoff=4.99 cfs 1.394 af

**Subcatchment 13S:** Runoff Area=2,395,812 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=2,356' Tc=84.2 min CN=74 Runoff=6.23 cfs 1.690 af

**Subcatchment 14S:** Runoff Area=516,650 sf 1.75% Impervious Runoff Depth=0.43"
Flow Length=935' Tc=36.6 min CN=76 Runoff=3.12 cfs 0.429 af

**Subcatchment 15S:** Runoff Area=329,223 sf 1.24% Impervious Runoff Depth=0.17"
Flow Length=707' Tc=30.6 min CN=66 Runoff=0.43 cfs 0.104 af

**Subcatchment 16S:** Runoff Area=1,134,608 sf 1.12% Impervious Runoff Depth=0.51"
Flow Length=1,611' Tc=58.8 min CN=78 Runoff=6.02 cfs 1.100 af

**Subcatchment 16SA:** Runoff Area=657,258 sf 1.69% Impervious Runoff Depth=0.43"
Tc=39.9 min CN=76 Runoff=3.73 cfs 0.546 af

| | |
|---|---|
| **Subcatchment 17S:** | Runoff Area=6,847,928 sf 0.59% Impervious Runoff Depth=0.47"<br>Flow Length=4,736' Tc=94.5 min CN=77 Runoff=22.97 cfs 6.155 af |
| **Subcatchment 18S:** | Runoff Area=4,001,602 sf 0.41% Impervious Runoff Depth=0.47"<br>Flow Length=3,889' Tc=66.4 min CN=77 Runoff=17.46 cfs 3.597 af |
| **Subcatchment 19S:** | Runoff Area=5,028,770 sf 0.59% Impervious Runoff Depth=0.43"<br>Flow Length=4,703' Tc=80.9 min CN=76 Runoff=17.12 cfs 4.179 af |
| **Subcatchment 20S:** | Runoff Area=2,479,797 sf 2.23% Impervious Runoff Depth=0.37"<br>Tc=71.1 min CN=74 Runoff=7.34 cfs 1.749 af |
| **Subcatchment 21S:** | Runoff Area=332,609 sf 6.38% Impervious Runoff Depth=0.23"<br>Flow Length=921' Tc=31.9 min CN=69 Runoff=0.80 cfs 0.147 af |
| **Subcatchment 22S:** | Runoff Area=785,644 sf 0.79% Impervious Runoff Depth=0.23"<br>Flow Length=1,439' Tc=53.3 min CN=69 Runoff=1.36 cfs 0.348 af |
| **Subcatchment 23S:** | Runoff Area=17,302,399 sf 0.42% Impervious Runoff Depth=0.43"<br>Flow Length=9,131' Tc=88.7 min CN=76 Runoff=55.11 cfs 14.379 af |
| **Subcatchment 24S:** | Runoff Area=260,905 sf 6.43% Impervious Runoff Depth=0.55"<br>Flow Length=1,200' Tc=31.2 min CN=79 Runoff=2.43 cfs 0.273 af |
| **Subcatchment 25S:** | Runoff Area=10,643,407 sf 0.28% Impervious Runoff Depth=0.40"<br>Flow Length=7,278' Tc=71.0 min CN=75 Runoff=35.47 cfs 8.159 af |
| **Subcatchment 26S:** | Runoff Area=823,994 sf 2.72% Impervious Runoff Depth=0.51"<br>Flow Length=1,347' Tc=43.1 min CN=78 Runoff=5.50 cfs 0.799 af |
| **Subcatchment 27S:** | Runoff Area=1,317,635 sf 4.05% Impervious Runoff Depth=0.28"<br>Flow Length=3,107' Tc=46.4 min CN=71 Runoff=3.47 cfs 0.710 af |
| **Subcatchment 28S:** | Runoff Area=2,868,130 sf 1.43% Impervious Runoff Depth=0.34"<br>Flow Length=2,822' Tc=32.9 min CN=73 Runoff=12.82 cfs 1.856 af |
| **Subcatchment 29S:** | Runoff Area=776,122 sf 2.65% Impervious Runoff Depth=0.37"<br>Flow Length=1,737' Tc=24.4 min CN=74 Runoff=4.92 cfs 0.547 af |
| **Subcatchment 30S:** | Runoff Area=618,450 sf 1.49% Impervious Runoff Depth=0.31"<br>Flow Length=1,427' Tc=38.4 min CN=72 Runoff=2.15 cfs 0.366 af |
| **Subcatchment 31S:** | Runoff Area=2,981,588 sf 0.44% Impervious Runoff Depth=0.37"<br>Flow Length=1,885' Tc=60.7 min CN=74 Runoff=9.88 cfs 2.103 af |
| **Subcatchment 32S:** | Runoff Area=4,274,758 sf 0.78% Impervious Runoff Depth=0.13"<br>Flow Length=3,031' Tc=75.2 min CN=64 Runoff=2.23 cfs 1.047 af |
| **Subcatchment 33S:** | Runoff Area=4,477,391 sf 0.00% Impervious Runoff Depth=0.21"<br>Flow Length=2,390' Tc=58.6 min CN=68 Runoff=6.14 cfs 1.782 af |

**Subcatchment 34S:** Runoff Area=1,658,827 sf 0.00% Impervious Runoff Depth=0.28"
Flow Length=1,443' Tc=42.0 min CN=71 Runoff=4.66 cfs 0.894 af

**Subcatchment 35S:** Runoff Area=2,634,778 sf 10.71% Impervious Runoff Depth=0.43"
Flow Length=3,089' Tc=26.1 min CN=76 Runoff=20.26 cfs 2.190 af

**Subcatchment 36S:** Runoff Area=6,697,461 sf 0.98% Impervious Runoff Depth=0.47"
Tc=38.4 min CN=77 Runoff=43.74 cfs 6.020 af

**Subcatchment 37S:** Runoff Area=3,957,824 sf 0.96% Impervious Runoff Depth=0.47"
Tc=39.6 min CN=77 Runoff=25.26 cfs 3.557 af

**Subcatchment 38S:** Runoff Area=734,553 sf 0.00% Impervious Runoff Depth=0.47"
Tc=38.1 min CN=77 Runoff=4.83 cfs 0.660 af

**Subcatchment 39S:** Runoff Area=2,495,408 sf 0.69% Impervious Runoff Depth=0.34"
Tc=54.4 min CN=73 Runoff=7.84 cfs 1.615 af

**Subcatchment 40S:** Runoff Area=2,878,096 sf 0.94% Impervious Runoff Depth=0.51"
Tc=47.3 min CN=78 Runoff=17.96 cfs 2.792 af

**Subcatchment 41S:** Runoff Area=1,003,158 sf 1.68% Impervious Runoff Depth=0.31"
Tc=46.5 min CN=72 Runoff=3.07 cfs 0.594 af

**Subcatchment 42S:** Runoff Area=7,512,433 sf 0.28% Impervious Runoff Depth=0.47"
Tc=96.3 min CN=77 Runoff=24.88 cfs 6.752 af

**Subcatchment 43S:** Runoff Area=2,645,848 sf 0.11% Impervious Runoff Depth=0.47"
Tc=48.7 min CN=77 Runoff=14.50 cfs 2.378 af

**Subcatchment 44S:** Runoff Area=5,126,184 sf 3.21% Impervious Runoff Depth=0.51"
Tc=97.1 min CN=78 Runoff=18.78 cfs 4.972 af

**Subcatchment 44SA:** Runoff Area=785,481 sf 3.78% Impervious Runoff Depth=0.51"
Tc=25.5 min CN=78 Runoff=7.63 cfs 0.762 af

**Subcatchment 45S:** Runoff Area=581,958 sf 9.77% Impervious Runoff Depth=0.59"
Tc=29.1 min CN=80 Runoff=6.26 cfs 0.654 af

**Subcatchment 46S:** Runoff Area=2,133,969 sf 0.00% Impervious Runoff Depth=0.40"
Tc=53.8 min CN=75 Runoff=8.67 cfs 1.636 af

**Subcatchment 47S:** Runoff Area=2,293,218 sf 1.04% Impervious Runoff Depth=0.51"
Tc=56.5 min CN=78 Runoff=12.52 cfs 2.224 af

**Total Runoff Area = 3,488.434 ac Runoff Volume = 109.766 af Average Runoff Depth = 0.38"**
**98.81% Pervious = 3,446.971 ac 1.19% Impervious = 41.462 ac**

## Summary for Subcatchment 1S:

Runoff = 2.37 cfs @ 12.82 hrs, Volume= 0.844 af, Depth= 0.15"
Routed to Reach SP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 94,531 | 77 | Woods, Good, HSG D |
| | 196,024 | 55 | Woods, Good, HSG B |
| | 9,804 | 48 | Brush, Good, HSG B |
| | 8,870 | 73 | Brush, Good, HSG D |
| * | 69,062 | 98 | Impervious Pavement |
| | 1,853,031 | 58 | Meadow, non-grazed, HSG B |
| | 789,551 | 78 | Meadow, non-grazed, HSG D |
| | 3,020,873 | 65 | Weighted Average |
| | 2,951,811 | | 97.71% Pervious Area |
| | 69,062 | | 2.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 15.8 | 784 | 0.0140 | 0.83 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 9.5 | 2,388 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 52.0 | 3,272 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 0.27 cfs @ 12.33 hrs, Volume= 0.080 af, Depth= 0.13"
Routed to Reach SP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 1,021 | 55 | Woods, Good, HSG B |
| 223,581 | 58 | Meadow, non-grazed, HSG B |
| 1,749 | 73 | Brush, Good, HSG D |
| 969 | 77 | Woods, Good, HSG D |
| 97,434 | 78 | Meadow, non-grazed, HSG D |
| 324,754 | 64 | Weighted Average |
| 324,754 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.6 | 241 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.1 | 445 | 0.0170 | 0.91 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 50 | 0.0300 | 0.87 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.1 | 836 | Total | | | |

## Summary for Subcatchment 4S:

[47] Hint: Peak is 319% of capacity of segment #4
[47] Hint: Peak is 191% of capacity of segment #9
[47] Hint: Peak is 906% of capacity of segment #13

Runoff = 26.54 cfs @ 13.06 hrs, Volume= 7.959 af, Depth= 0.26"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 5,031 | 48 | Brush, Good, HSG B |
| * | 29,184 | 98 | Impervious Pavement |
| * | 9,824 | 98 | Impervious Roof |
| | 708,087 | 58 | Meadow, non-grazed, HSG B |
| | 34,201 | 55 | Woods, Good, HSG B |
| | 34,999 | 73 | Brush, Good, HSG D |
| | 320,256 | 77 | Woods, Good, HSG D |
| | 1,271 | 70 | Woods, Good, HSG C |
| | 170,830 | 71 | Meadow, non-grazed, HSG C |
| * | 2,590 | 96 | Gravel |
| * | 29,099 | 98 | Impervious Pavement |
| * | 287 | 98 | Impervious Roof |
| | 3,181,257 | 78 | Meadow, non-grazed, HSG D |
| | 9,634 | 48 | Brush, Good, HSG B |
| | 868,528 | 55 | Woods, Good, HSG B |
| * | 30,257 | 98 | Impervious Pavement |
| * | 10,455 | 98 | Impervious Roof |
| * | 4,215 | 96 | Gravel |
| | 2,040,672 | 58 | Meadow, non-grazed, HSG B |
| | 38,512 | 78 | Meadow, non-grazed, HSG D |
| | 55,419 | 77 | Woods, Good, HSG D |
| | 334,887 | 78 | Meadow, non-grazed, HSG D |
| | 26,398 | 73 | Brush, Good, HSG D |
| * | 20,636 | 98 | Impervious Pavement |
| | 885,711 | 77 | Woods, Good, HSG D |
| * | 4,759 | 96 | Gravel |
| | 2,163,012 | 78 | Meadow, non-grazed, HSG D |
| * | 10,062 | 98 | Impervious Roof |
| * | 13,878 | 98 | Impervious Pavement |
| * | 13,754 | 96 | Gravel |
| * | 15,803 | 98 | Water |
| | 777,230 | 55 | Woods, Good, HSG B |
| | 16,892 | 48 | Brush, Good, HSG B |
| | 1,287,972 | 58 | Meadow, non-grazed, HSG B |
| * | 72,761 | 98 | Impervious Pavement |
| * | 14,040 | 98 | Impervious Roof |
| * | 1,010 | 96 | Gravel |
| | 91,670 | 77 | Woods, Good, HSG D |
| | 16,841 | 73 | Brush, Good, HSG D |
| | 1,693,872 | 78 | Meadow, non-grazed, HSG D |
| | 55,622 | 55 | Woods, Good, HSG B |
| * | 4,369 | 98 | Impervious Pavement |
| | 643,096 | 58 | Meadow, non-grazed, HSG B |
| | 41,645 | 70 | Woods, Good, HSG C |
| | 470,010 | 71 | Meadow, non-grazed, HSG C |
| | 16,260,538 | 70 | Weighted Average |
| | 15,999,883 | | 98.40% Pervious Area |
| | 260,655 | | 1.60% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 277 | 0.0150 | 0.86 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 5.6 | 778 | 0.0240 | 2.32 | | **Shallow Concentrated Flow,**<br>Grassed Waterway Kv= 15.0 fps |
| 0.3 | 40 | 0.0050 | 2.65 | 8.32 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.1 | 741 | | 5.90 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.8 | 401 | | 3.76 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 0.0 | 18 | 0.0560 | 8.86 | 27.84 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.3 | 605 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 36 | 0.0140 | 4.43 | 13.92 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.3 | 627 | | 4.46 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 40 | 0.0750 | 10.25 | 32.22 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.1 | 527 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.2 | 40 | 0.0250 | 3.73 | 2.93 | **Pipe Channel,**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.025 Corrugated metal |
| 4.0 | 593 | | 2.47 | | **Direct Entry, Roadside Ditch** |
| 0.1 | 40 | 0.0250 | 6.87 | 33.72 | **Pipe Channel,**<br>30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63'<br>n= 0.025 Corrugated metal |
| 23.2 | 2,925 | | 2.10 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.3 | 7,788 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 7.29 cfs @ 12.38 hrs, Volume= 1.087 af, Depth= 0.34"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,333 | 96 | Gravel |
| | 136,520 | 70 | Woods, Good, HSG C |
| * | 438 | 98 | Impervious Pavement |
| * | 6,831 | 98 | Impervious Roof |
| * | 7,136 | 98 | Water |
| | 915,909 | 71 | Meadow, non-grazed, HSG C |
| | 57,613 | 55 | Woods, Good, HSG B |
| * | 1,117 | 98 | Impervious Pavement |
| | 3,366 | 48 | Brush, Good, HSG B |
| * | 813 | 96 | Gravel |
| | 60,234 | 58 | Meadow, non-grazed, HSG B |
| * | 66,794 | 98 | Water |
| | 6,417 | 73 | Brush, Good, HSG D |
| * | 3,263 | 96 | Gravel |
| | 517 | 77 | Woods, Good, HSG D |
| | 199,842 | 78 | Meadow, non-grazed, HSG D |
| | 201,091 | 78 | Meadow, non-grazed, HSG D |
| | 1,679,234 | 73 | Weighted Average |
| | 1,596,918 | | 95.10% Pervious Area |
| | 82,316 | | 4.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 12.9 | 842 | 0.0240 | 1.08 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.2 | 311 | | 4.42 | | **Direct Entry, Grassed Waterway** |
| 0.6 | 242 | | 6.54 | | **Direct Entry, Grassed Waterway** |
| 34.3 | 1,495 | Total | | | |

## Summary for Subcatchment 6S:

Runoff = 2.03 cfs @ 12.47 hrs, Volume= 0.354 af, Depth= 0.31"
Routed to Reach SP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 23,122 | 70 | Woods, Good, HSG C |
| 31,419 | 65 | Brush, Good, HSG C |
| 437,478 | 71 | Meadow, non-grazed, HSG C |
| 11,524 | 73 | Brush, Good, HSG D |
| 2,524 | 77 | Woods, Good, HSG D |
| 55,990 | 78 | Meadow, non-grazed, HSG D |
| 1,516 | 70 | Woods, Good, HSG C |
| 2,812 | 77 | Woods, Good, HSG D |
| 20,186 | 78 | Meadow, non-grazed, HSG D |
| 12,052 | 71 | Meadow, non-grazed, HSG C |
| 598,623 | 72 | Weighted Average |
| 598,623 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 4.3 | 256 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.5 | 341 | 0.1030 | 2.25 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.4 | 316 | 0.1870 | 2.16 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 1.8 | 137 | | 1.26 | | **Direct Entry, Grassed Waterway** |
| 39.7 | 1,150 | Total | | | |

## Summary for Subcatchment 7S:

Runoff = 17.50 cfs @ 13.07 hrs, Volume= 5.254 af, Depth= 0.26"
Routed to Reach SP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,822,055 | 58 | Meadow, non-grazed, HSG B |
| | 23,489 | 48 | Brush, Good, HSG B |
| | 640,040 | 55 | Woods, Good, HSG B |
| | 2,269,487 | 71 | Meadow, non-grazed, HSG C |
| | 2,183 | 65 | Brush, Good, HSG C |
| | 137,505 | 70 | Woods, Good, HSG C |
| | 2,942,616 | 78 | Meadow, non-grazed, HSG D |
| | 53,119 | 73 | Brush, Good, HSG D |
| | 1,829,743 | 77 | Woods, Good, HSG D |
| * | 11,894 | 98 | Impervious |
| * | 2,632 | 96 | Gravel |
| | 10,734,763 | 70 | Weighted Average |
| | 10,722,869 | | 99.89% Pervious Area |
| | 11,894 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 449 | 0.0390 | 1.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.2 | 512 | 0.0220 | 1.04 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 20.3 | 945 | 0.0240 | 0.77 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 192 | 0.0310 | 0.88 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 14.9 | 3,312 | | 3.70 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.1 | 284 | 0.0530 | 1.15 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.8 | 711 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.1 | 6,505 | Total | | | |

## Summary for Subcatchment 8S:

Runoff = 4.04 cfs @ 12.32 hrs, Volume= 0.606 af, Depth= 0.28"
Routed to Reach SP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 0 | 55 | Woods, Good, HSG B |
| * | 1,030 | 98 | Impervious Pavement |
| | 27,402 | 58 | Meadow, non-grazed, HSG B |
| | 15,462 | 77 | Woods, Good, HSG D |
| * | 6,130 | 98 | Impervious Pavement |
| | 200,339 | 78 | Meadow, non-grazed, HSG D |
| | 25,785 | 55 | Woods, Good, HSG B |
| * | 1,580 | 96 | Gravel |
| * | 5,152 | 98 | Impervious Pavement |
| | 191,169 | 58 | Meadow, non-grazed, HSG B |
| * | 7,435 | 98 | Impervious Pavement |
| | 9,470 | 77 | Woods, Good, HSG D |
| | 423,047 | 78 | Meadow, non-grazed, HSG D |
| | 12,817 | 65 | Brush, Good, HSG C |
| * | 2,902 | 98 | Impervious Pavement |
| * | 3,771 | 96 | Gravel |
| * | 670 | 98 | Impervious Roof |
| | 190,360 | 58 | Meadow, non-grazed, HSG B |
| | 1,124,521 | 71 | Weighted Average |
| | 1,101,202 | | 97.93% Pervious Area |
| | 23,319 | | 2.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.2 | 100 | 0.0420 | 0.14 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.0 | 364 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 1,017 | | 2.68 | | **Direct Entry, Roadside Ditch** |
| 5.0 | 1,137 | | 3.82 | | **Direct Entry, Roadside Ditch** |
| 29.5 | 2,618 | Total | | | |

## Summary for Subcatchment 9S:

Runoff = 2.35 cfs @ 13.04 hrs, Volume= 0.581 af, Depth= 0.43"
Routed to Reach SP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 46,629 | 98 | Water |
| * | 6,554 | 98 | Impervious Pavement |
| | 424,080 | 78 | Meadow, non-grazed, HSG D |
| | 2,058 | 55 | Woods, Good, HSG B |
| | 7,321 | 48 | Brush, Good, HSG B |
| * | 10,739 | 98 | Water |
| * | 1,356 | 98 | Impervious Pavement |
| | 110,953 | 58 | Meadow, non-grazed, HSG B |
| * | 3,190 | 98 | Impervious Pavement |
| | 19,729 | 73 | Brush, Good, HSG D |
| | 66,251 | 78 | Meadow, non-grazed, HSG D |
| | 698,860 | 76 | Weighted Average |
| | 630,392 | | 90.20% Pervious Area |
| | 68,468 | | 9.80% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.0 | 540 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.6 | 572 | | 1.11 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 81.2 | 1,212 | Total | | | |

## Summary for Subcatchment 10S:

Runoff = 4.95 cfs @ 13.11 hrs, Volume= 1.298 af, Depth= 0.43"
Routed to Reach SP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 35,373 | 55 | Woods, Good, HSG B |
| 4,798 | 48 | Brush, Good, HSG B |
| 92,207 | 58 | Meadow, non-grazed, HSG B |
| 87,496 | 73 | Brush, Good, HSG D |
| 13,364 | 77 | Woods, Good, HSG D |
| 1,328,032 | 78 | Meadow, non-grazed, HSG D |
| 1,561,270 | 76 | Weighted Average |
| 1,561,270 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 16.9 | 388 | 0.0030 | 0.38 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 33 | 0.0610 | 1.23 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 3.6 | 165 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 3.2 | 310 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 8.2 | 920 | | 1.88 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.5 | 295 | | 3.39 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 88.4 | 2,211 | Total | | | |

## Summary for Subcatchment 11S:

Runoff = 3.85 cfs @ 12.46 hrs, Volume= 0.545 af, Depth= 0.55"
Routed to Reach SP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 17,843 | 98 | Paved parking, HSG D |
| 501,616 | 78 | Meadow, non-grazed, HSG D |
| 1,885 | 73 | Brush, Good, HSG D |
| 521,344 | 79 | Weighted Average |
| 503,501 | | 96.58% Pervious Area |
| 17,843 | | 3.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.2 | 100 | 0.0120 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 11.8 | 521 | 0.0110 | 0.73 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.1 | 418 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,039 | Total | | | |

## Summary for Subcatchment 12S:

Runoff = 4.99 cfs @ 13.36 hrs, Volume= 1.394 af, Depth= 0.51"
Routed to Reach SP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,897 | 98 | Impervious |
| | 8,690 | 58 | Meadow, non-grazed, HSG B |
| | 1,313,095 | 78 | Meadow, non-grazed, HSG D |
| | 5,821 | 73 | Brush, Good, HSG D |
| | 101,013 | 77 | Woods, Good, HSG D |
| | 1,437,516 | 78 | Weighted Average |
| | 1,428,619 | | 99.38% Pervious Area |
| | 8,897 | | 0.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 30.7 | 100 | 0.0470 | 0.05 | | **Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.40" |
| 25.9 | 601 | 0.0060 | 0.39 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 48.0 | 1,687 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 104.6 | 2,388 | Total | | | |

## Summary for Subcatchment 13S:

Runoff = 6.23 cfs @ 13.09 hrs, Volume= 1.690 af, Depth= 0.37"
Routed to Reach SP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 279,893 | 58 | Meadow, non-grazed, HSG B |
| 1,558,214 | 78 | Meadow, non-grazed, HSG D |
| 424 | 48 | Brush, Good, HSG B |
| 77,097 | 73 | Brush, Good, HSG D |
| 142,209 | 55 | Woods, Good, HSG B |
| 337,975 | 77 | Woods, Good, HSG D |
| 2,395,812 | 74 | Weighted Average |
| 2,395,812 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0230 | 0.11 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 48.9 | 1,838 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 418 | 0.0050 | 0.35 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 84.2 | 2,356 | Total | | | |

## Summary for Subcatchment 14S:

Runoff = 3.12 cfs @ 12.39 hrs, Volume= 0.429 af, Depth= 0.43"
Routed to Reach SP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,018 | 98 | Impervious |
| | 70,714 | 58 | Meadow, non-grazed, HSG B |
| | 428,883 | 78 | Meadow, non-grazed, HSG D |
| | 744 | 48 | Brush, Good, HSG B |
| | 189 | 73 | Brush, Good, HSG D |
| | 7,102 | 77 | Woods, Good, HSG D |
| | 516,650 | 76 | Weighted Average |
| | 507,632 | | 98.25% Pervious Area |
| | 9,018 | | 1.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.1 | 835 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.6 | 935 | Total | | | |

## Summary for Subcatchment 15S:

Runoff = 0.43 cfs @ 12.41 hrs, Volume= 0.104 af, Depth= 0.17"
Routed to Reach SP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 4,081 | 98 | Impervious |
| | 181,283 | 58 | Meadow, non-grazed, HSG B |
| | 126,101 | 78 | Meadow, non-grazed, HSG D |
| | 6,560 | 48 | Brush, Good, HSG B |
| | 2,092 | 73 | Brush, Good, HSG D |
| | 5,023 | 55 | Woods, Good, HSG B |
| | 4,083 | 77 | Woods, Good, HSG D |
| | 329,223 | 66 | Weighted Average |
| | 325,142 | | 98.76% Pervious Area |
| | 4,081 | | 1.24% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.9 | 100 | 0.0220 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 387 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.3 | 220 | 0.0040 | 0.44 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 30.6 | 707 | Total | | | |

## Summary for Subcatchment 16S:

Runoff = 6.02 cfs @ 12.69 hrs, Volume= 1.100 af, Depth= 0.51"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,714 | 98 | Impervious |
| | 25,066 | 71 | Meadow, non-grazed, HSG C |
| | 938,415 | 78 | Meadow, non-grazed, HSG D |
| | 3,358 | 73 | Brush, Good, HSG D |
| | 863 | 70 | Woods, Good, HSG C |
| | 154,192 | 77 | Woods, Good, HSG D |
| | 1,134,608 | 78 | Weighted Average |
| | 1,121,894 | | 98.88% Pervious Area |
| | 12,714 | | 1.12% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.0 | 100 | 0.0170 | 0.06 | | **Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.40" |
| 3.8 | 142 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 26.0 | 1,035 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.0 | 334 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.8 | 1,611 | Total | | | |

## Summary for Subcatchment 16SA:

Runoff = 3.73 cfs @ 12.43 hrs, Volume= 0.546 af, Depth= 0.43"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,093 | 98 | Impervious |
| | 70,093 | 58 | Meadow, non-grazed, HSG B |
| | 359,929 | 78 | Meadow, non-grazed, HSG D |
| | 259 | 48 | Brush, Good, HSG B |
| | 14,806 | 73 | Brush, Good, HSG D |
| | 0 | 70 | Woods, Good, HSG C |
| | 201,078 | 77 | Woods, Good, HSG D |
| | 657,258 | 76 | Weighted Average |
| | 646,165 | | 98.31% Pervious Area |
| | 11,093 | | 1.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.9 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 17S:

Runoff = 22.97 cfs @ 13.17 hrs, Volume= 6.155 af, Depth= 0.47"
Routed to Reach SP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 22,601 | 98 | Water Surface, HSG A |
| * | 17,632 | 98 | Impervious |
| | 252,955 | 71 | Meadow, non-grazed, HSG C |
| | 4,937,352 | 78 | Meadow, non-grazed, HSG D |
| | 16,810 | 65 | Brush, Good, HSG C |
| | 130,011 | 73 | Brush, Good, HSG D |
| | 111,819 | 70 | Woods, Good, HSG C |
| | 1,358,748 | 77 | Woods, Good, HSG D |
| | 6,847,928 | 77 | Weighted Average |
| | 6,807,695 | | 99.41% Pervious Area |
| | 40,233 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.1 | 50 | 0.0300 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 10.9 | 50 | 0.0140 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 32.6 | 2,373 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 33.8 | 1,418 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.1 | 845 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 94.5 | 4,736 | Total | | | |

## Summary for Subcatchment 18S:

Runoff = 17.46 cfs @ 12.79 hrs, Volume= 3.597 af, Depth= 0.47"
Routed to Reach SP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,953 | 98 | Water Surface, HSG A |
| * | 13,432 | 98 | Impervious |
| | 5,975 | 58 | Meadow, non-grazed, HSG B |
| | 29,944 | 71 | Meadow, non-grazed, HSG C |
| | 2,207,221 | 78 | Meadow, non-grazed, HSG D |
| | 157,865 | 73 | Brush, Good, HSG D |
| | 23,440 | 55 | Woods, Good, HSG B |
| | 321,869 | 70 | Woods, Good, HSG C |
| | 1,238,903 | 77 | Woods, Good, HSG D |
| | 4,001,602 | 77 | Weighted Average |
| | 3,985,217 | | 99.59% Pervious Area |
| | 16,385 | | 0.41% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.8 | 100 | 0.0150 | 0.06 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 6.8 | 205 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.6 | 2,144 | 0.0920 | 1.52 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.2 | 1,440 | | 2.92 | | **Direct Entry, Ditch** |
| 66.4 | 3,889 | Total | | | |

## Summary for Subcatchment 19S:

Runoff = 17.12 cfs @ 13.04 hrs, Volume= 4.179 af, Depth= 0.43"
Routed to Reach SP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,609 | 98 | Impervious |
| | 21,503 | 96 | Gravel surface, HSG A |
| | 84,734 | 58 | Meadow, non-grazed, HSG B |
| | 89,335 | 71 | Meadow, non-grazed, HSG C |
| | 2,422,408 | 78 | Meadow, non-grazed, HSG D |
| | 10,082 | 48 | Brush, Good, HSG B |
| | 74,495 | 73 | Brush, Good, HSG D |
| | 16,971 | 55 | Woods, Good, HSG B |
| | 681,805 | 70 | Woods, Good, HSG C |
| | 1,597,828 | 77 | Woods, Good, HSG D |
| | 5,028,770 | 76 | Weighted Average |
| | 4,999,161 | | 99.41% Pervious Area |
| | 29,609 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.7 | 100 | 0.0100 | 0.05 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 21.4 | 1,915 | 0.0890 | 1.49 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.3 | 706 | 0.0720 | 1.88 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.7 | 109 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.9 | 244 | 0.0410 | 1.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.2 | 706 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 6.7 | 923 | | 2.30 | | **Direct Entry, Small Tributary & Swamps w/ Channels** |
| 80.9 | 4,703 | Total | | | |

## Summary for Subcatchment 20S:

Runoff = 7.34 cfs @ 12.91 hrs, Volume= 1.749 af, Depth= 0.37"
Routed to Reach SP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 16,368 | 98 | Water Surface, HSG A |
| * | 38,886 | 98 | Impervious |
| | 503 | 96 | Gravel surface, HSG A |
| | 99,447 | 30 | Meadow, non-grazed, HSG A |
| | 58,596 | 58 | Meadow, non-grazed, HSG B |
| | 130,201 | 71 | Meadow, non-grazed, HSG C |
| | 1,680,681 | 78 | Meadow, non-grazed, HSG D |
| | 21,162 | 73 | Brush, Good, HSG D |
| | 131,716 | 55 | Woods, Good, HSG B |
| | 6,015 | 70 | Woods, Good, HSG C |
| | 296,222 | 77 | Woods, Good, HSG D |
| | 2,479,797 | 74 | Weighted Average |
| | 2,424,543 | | 97.77% Pervious Area |
| | 55,254 | | 2.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 71.1 | | | | | **Direct Entry, SEE SPREDSHEET** |

## Summary for Subcatchment 21S:

Runoff = 0.80 cfs @ 12.38 hrs, Volume= 0.147 af, Depth= 0.23"
Routed to Reach SP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 28,890 | 30 | Meadow, non-grazed, HSG A |
| 262,110 | 71 | Meadow, non-grazed, HSG C |
| 12,438 | 78 | Meadow, non-grazed, HSG D |
| 683 | 30 | Brush, Good, HSG A |
| 5,947 | 65 | Brush, Good, HSG C |
| 1,322 | 30 | Woods, Good, HSG A |
| 21,219 | 98 | Paved roads w/curbs & sewers, HSG A |
| 332,609 | 69 | Weighted Average |
| 311,390 | | 93.62% Pervious Area |
| 21,219 | | 6.38% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0410 | 0.13 | | **Sheet Flow,** |
| | | | | | Grass: Dense n= 0.240 P2= 2.40" |
| 19.5 | 821 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture Kv= 7.0 fps |
| 31.9 | 921 | Total | | | |

## Summary for Subcatchment 22S:

Runoff = 1.36 cfs @ 12.73 hrs, Volume= 0.348 af, Depth= 0.23"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 87,197 | 30 | Meadow, non-grazed, HSG A |
| 418,867 | 71 | Meadow, non-grazed, HSG C |
| 134,602 | 78 | Meadow, non-grazed, HSG D |
| 814 | 65 | Brush, Good, HSG C |
| 7,253 | 73 | Brush, Good, HSG D |
| 843 | 30 | Woods, Good, HSG A |
| 3,389 | 70 | Woods, Good, HSG C |
| 126,479 | 77 | Woods, Good, HSG D |
| 6,200 | 98 | Paved roads w/curbs & sewers, HSG A |
| 785,644 | 69 | Weighted Average |
| 779,444 | | 99.21% Pervious Area |
| 6,200 | | 0.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 22.4 | 1,072 | 0.0130 | 0.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 83 | 0.1330 | 1.82 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.4 | 184 | | 2.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 53.3 | 1,439 | Total | | | |

## Summary for Subcatchment 23S:

Runoff = 55.11 cfs @ 13.12 hrs, Volume= 14.379 af, Depth= 0.43"
Routed to Reach SP23 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 33,228 | 30 | Meadow, non-grazed, HSG A |
| 494,460 | 71 | Meadow, non-grazed, HSG C |
| 7,349,351 | 78 | Meadow, non-grazed, HSG D |
| 299,742 | 65 | Brush, Good, HSG C |
| 1,788,044 | 73 | Brush, Good, HSG D |
| 1,493,479 | 70 | Woods, Good, HSG C |
| 5,745,558 | 77 | Woods, Good, HSG D |
| 73,510 | 98 | Paved roads w/curbs & sewers, HSG D |
| 25,027 | 96 | Gravel surface, HSG D |
| 17,302,399 | 76 | Weighted Average |
| 17,228,889 | | 99.58% Pervious Area |
| 73,510 | | 0.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.4 | 100 | 0.0420 | 0.09 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 22.2 | 1,941 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.2 | 806 | 0.0580 | 1.20 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.6 | 1,740 | | 2.49 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.2 | 1,229 | | 4.93 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 9.5 | 1,895 | | 3.32 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 3.8 | 650 | | 2.82 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 7.8 | 770 | | 1.64 | | **Direct Entry, Roadside Ditch** |
| 88.7 | 9,131 | Total | | | |

## Summary for Subcatchment 24S:

Runoff = 2.43 cfs @ 12.29 hrs, Volume= 0.273 af, Depth= 0.55"
Routed to Reach SP24 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 226,229 | 78 | Meadow, non-grazed, HSG D |
| 7,721 | 73 | Brush, Good, HSG D |
| 10,176 | 77 | Woods, Good, HSG D |
| 16,779 | 98 | Paved roads w/curbs & sewers, HSG D |
| 260,905 | 79 | Weighted Average |
| 244,126 | | 93.57% Pervious Area |
| 16,779 | | 6.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.1 | 100 | 0.0250 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 14.0 | 830 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.1 | 270 | | 2.17 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 31.2 | 1,200 | Total | | | |

## Summary for Subcatchment 25S:

Runoff = 35.47 cfs @ 12.88 hrs, Volume= 8.159 af, Depth= 0.40"
Routed to Reach SP25 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 816,850 | 58 | Meadow, non-grazed, HSG B |
| 955,101 | 71 | Meadow, non-grazed, HSG C |
| 5,104,595 | 78 | Meadow, non-grazed, HSG D |
| 18,372 | 48 | Brush, Good, HSG B |
| 265,288 | 73 | Brush, Good, HSG D |
| 189,511 | 55 | Woods, Good, HSG B |
| 3,244,843 | 77 | Woods, Good, HSG D |
| 29,278 | 98 | Paved roads w/curbs & sewers, HSG D |
| 19,569 | 96 | Gravel surface, HSG D |
| 10,643,407 | 75 | Weighted Average |
| 10,614,129 | | 99.72% Pervious Area |
| 29,278 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.9 | 1,281 | 0.0510 | 1.13 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.8 | 640 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 17.1 | 4,093 | | 3.98 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.6 | 482 | | 1.76 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.8 | 682 | | 2.39 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 71.0 | 7,278 | Total | | | |

## Summary for Subcatchment 26S:

Runoff = 5.50 cfs @ 12.46 hrs, Volume= 0.799 af, Depth= 0.51"
Routed to Reach SP26 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 75,400 | 77 | Woods, Good, HSG D |
| * | 4,254 | 98 | Water |
| | 50,954 | 71 | Meadow, non-grazed, HSG C |
| * | 18,174 | 98 | Impervious Pavement |
| | 675,212 | 78 | Meadow, non-grazed, HSG D |
| | 823,994 | 78 | Weighted Average |
| | 801,566 | | 97.28% Pervious Area |
| | 22,428 | | 2.72% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 527 | | 1.64 | | **Direct Entry, Ditch** |
| 19.2 | 720 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,347 | Total | | | |

## Summary for Subcatchment 27S:

Runoff = 3.47 cfs @ 12.57 hrs, Volume= 0.710 af, Depth= 0.28"
Routed to Reach SP27 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 102,395 | 30 | Meadow, non-grazed, HSG A |
| 70,249 | 58 | Meadow, non-grazed, HSG B |
| 356,229 | 71 | Meadow, non-grazed, HSG C |
| 594,316 | 78 | Meadow, non-grazed, HSG D |
| 15,001 | 48 | Brush, Good, HSG B |
| 136 | 65 | Brush, Good, HSG C |
| 35,121 | 73 | Brush, Good, HSG D |
| 1,761 | 30 | Woods, Good, HSG A |
| 10,015 | 55 | Woods, Good, HSG B |
| 44,190 | 70 | Woods, Good, HSG C |
| 27,054 | 77 | Woods, Good, HSG D |
| 53,425 | 98 | Paved roads w/curbs & sewers, HSG A |
| 7,743 | 96 | Gravel surface, HSG A |
| 1,317,635 | 71 | Weighted Average |
| 1,264,210 | | 95.95% Pervious Area |
| 53,425 | | 4.05% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 7.4 | 973 | 0.0970 | 2.18 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.4 | 548 | 0.0820 | 1.43 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.0 | 152 | 0.0330 | 1.27 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 12.9 | 824 | 0.0230 | 1.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 510 | | 1.34 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 46.4 | 3,107 | Total | | | |

## Summary for Subcatchment 28S:

Runoff = 12.82 cfs @ 12.35 hrs, Volume= 1.856 af, Depth= 0.34"
Routed to Reach SP28 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 148,045 | 58 | Meadow, non-grazed, HSG B |
| | 1,391,071 | 71 | Meadow, non-grazed, HSG C |
| | 1,142,501 | 78 | Meadow, non-grazed, HSG D |
| | 16,837 | 48 | Brush, Good, HSG B |
| | 158 | 65 | Brush, Good, HSG C |
| | 36,741 | 73 | Brush, Good, HSG D |
| | 39,665 | 55 | Woods, Good, HSG B |
| | 794 | 70 | Woods, Good, HSG C |
| | 51,395 | 77 | Woods, Good, HSG D |
| * | 40,923 | 98 | Impervious Surface |
| | 2,868,130 | 73 | Weighted Average |
| | 2,827,207 | | 98.57% Pervious Area |
| | 40,923 | | 1.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.3 | 163 | 0.0290 | 1.19 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.0 | 2,559 | | 3.88 | | **Direct Entry, Roadside Ditch** |
| 32.9 | 2,822 | Total | | | |

## Summary for Subcatchment 29S:

Runoff = 4.92 cfs @ 12.22 hrs, Volume= 0.547 af, Depth= 0.37"
Routed to Reach SP29 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,206 | 70 | Woods, Good, HSG C |
| * | 7,569 | 98 | Impervious Pavement |
| * | 4,117 | 98 | Impervious Roof |
| * | 5,127 | 96 | Gravel |
| | 247,913 | 71 | Meadow, non-grazed, HSG C |
| | 11,168 | 55 | Woods, Good, HSG B |
| | 740 | 65 | Brush, Good, HSG C |
| | 9,072 | 48 | Brush, Good, HSG B |
| * | 428 | 98 | Impervious Roof |
| | 56,539 | 58 | Meadow, non-grazed, HSG B |
| * | 8,416 | 98 | Impervious Pavement |
| | 16,068 | 77 | Woods, Good, HSG D |
| | 374,759 | 78 | Meadow, non-grazed, HSG D |
| | 776,122 | 74 | Weighted Average |
| | 755,592 | | 97.35% Pervious Area |
| | 20,530 | | 2.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.3 | 100 | 0.0650 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 0.5 | 63 | 0.0950 | 2.16 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 31 | 0.1290 | 1.80 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.1 | 612 | 0.0570 | 1.67 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.1 | 31 | 0.6100 | 3.91 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 7.1 | 900 | | 2.12 | | **Direct Entry, Roadside Ditch** |
| 24.4 | 1,737 | Total | | | |

## Summary for Subcatchment 30S:

Runoff = 2.15 cfs @ 12.44 hrs, Volume= 0.366 af, Depth= 0.31"
Routed to Reach SP30 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 511,468 | 71 | Meadow, non-grazed, HSG C |
| | 80,980 | 78 | Meadow, non-grazed, HSG D |
| | 16,758 | 70 | Woods, Good, HSG C |
| * | 9,244 | 98 | Impervious Surface |
| | 618,450 | 72 | Weighted Average |
| | 609,206 | | 98.51% Pervious Area |
| | 9,244 | | 1.49% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 10.4 | 1,152 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.3 | 175 | | 2.28 | | **Direct Entry, Roadside Ditch** |
| 38.4 | 1,427 | Total | | | |

## Summary for Subcatchment 31S:

Runoff = 9.88 cfs @ 12.76 hrs, Volume= 2.103 af, Depth= 0.37"
Routed to Reach SP31 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 66,905 | 58 | Meadow, non-grazed, HSG B |
| | 1,185,943 | 71 | Meadow, non-grazed, HSG C |
| | 1,398,406 | 78 | Meadow, non-grazed, HSG D |
| | 1,947 | 73 | Brush, Good, HSG D |
| | 84,560 | 55 | Woods, Good, HSG B |
| | 17,524 | 70 | Woods, Good, HSG C |
| | 213,262 | 77 | Woods, Good, HSG D |
| * | 13,041 | 98 | Impervious Surface |
| | 2,981,588 | 74 | Weighted Average |
| | 2,968,547 | | 99.56% Pervious Area |
| | 13,041 | | 0.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 35.2 | 100 | 0.0030 | 0.05 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.2 | 219 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.4 | 252 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.7 | 592 | 0.0440 | 1.47 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.2 | 722 | | 2.87 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 60.7 | 1,885 | Total | | | |

## Summary for Subcatchment 32S:

Runoff = 2.23 cfs @ 13.29 hrs, Volume= 1.047 af, Depth= 0.13"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,541,060 | 58 | Meadow, non-grazed, HSG B |
| | 716,554 | 71 | Meadow, non-grazed, HSG C |
| | 517,326 | 78 | Meadow, non-grazed, HSG D |
| | 869 | 48 | Brush, Good, HSG B |
| | 3,094 | 65 | Brush, Good, HSG C |
| | 4,465 | 73 | Brush, Good, HSG D |
| | 200,046 | 55 | Woods, Good, HSG B |
| | 46,472 | 70 | Woods, Good, HSG C |
| | 208,119 | 77 | Woods, Good, HSG D |
| * | 33,483 | 98 | Impervious Surface |
| | 3,270 | 96 | Gravel surface, HSG A |
| | 4,274,758 | 64 | Weighted Average |
| | 4,241,275 | | 99.22% Pervious Area |
| | 33,483 | | 0.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0200 | 0.10 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 848 | 0.1000 | 2.21 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 52.3 | 2,083 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 75.2 | 3,031 | Total | | | |

## Summary for Subcatchment 33S:

Runoff = 6.14 cfs @ 12.83 hrs, Volume= 1.782 af, Depth= 0.21"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 1,722,412 | 58 | Meadow, non-grazed, HSG B |
| 1,542,409 | 78 | Meadow, non-grazed, HSG D |
| 1,381 | 73 | Brush, Good, HSG D |
| 384,753 | 55 | Woods, Good, HSG B |
| 826,436 | 77 | Woods, Good, HSG D |
| 4,477,391 | 68 | Weighted Average |
| 4,477,391 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.1 | 100 | 0.0340 | 0.08 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 24.6 | 932 | 0.0160 | 0.63 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.8 | 1,157 | 0.0460 | 1.50 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 60 | 0.3120 | 2.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 0.7 | 141 | | 3.19 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.6 | 2,390 | Total | | | |

## Summary for Subcatchment 34S:

Runoff = 4.66 cfs @ 12.51 hrs, Volume= 0.894 af, Depth= 0.28"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 20,254 | 58 | Meadow, non-grazed, HSG B |
| 937,330 | 78 | Meadow, non-grazed, HSG D |
| 16,371 | 48 | Brush, Good, HSG B |
| 35,437 | 73 | Brush, Good, HSG D |
| 429,230 | 55 | Woods, Good, HSG B |
| 220,205 | 77 | Woods, Good, HSG D |
| 1,658,827 | 71 | Weighted Average |
| 1,658,827 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.5 | 100 | 0.0320 | 0.08 | | **Sheet Flow,**<br>Woods: Light underbrush n= 0.400 P2= 2.40" |
| 2.9 | 130 | 0.0220 | 0.74 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 18.3 | 1,058 | 0.0190 | 0.96 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 155 | | 8.93 | | **Direct Entry, Small tributary & Swamp w/channels** |
| 42.0 | 1,443 | Total | | | |

## Summary for Subcatchment 35S:

Runoff = 20.26 cfs @ 12.24 hrs, Volume= 2.190 af, Depth= 0.43"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 32,311 | 58 | Meadow, non-grazed, HSG B |
| 36,347 | 71 | Meadow, non-grazed, HSG C |
| 1,445,641 | 78 | Meadow, non-grazed, HSG D |
| 26,860 | 73 | Brush, Good, HSG D |
| 450,341 | 55 | Woods, Good, HSG B |
| 79,608 | 70 | Woods, Good, HSG C |
| 204,736 | 77 | Woods, Good, HSG D |
| 282,102 | 98 | Paved roads w/curbs & sewers, HSG D |
| 76,832 | 96 | Gravel surface, HSG D |
| 2,634,778 | 76 | Weighted Average |
| 2,352,676 | | 89.29% Pervious Area |
| 282,102 | | 10.71% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.4 | 100 | 0.0050 | 0.68 | | **Sheet Flow,**<br>Smooth surfaces n= 0.011 P2= 2.40" |
| 2.6 | 755 | 0.0590 | 4.93 | | **Shallow Concentrated Flow,**<br>Paved Kv= 20.3 fps |
| 2.5 | 438 | | 2.91 | | **Direct Entry,** |
| 17.6 | 1,445 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 351 | | 5.94 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 26.1 | 3,089 | Total | | | |

## Summary for Subcatchment 36S:

Runoff = 43.74 cfs @ 12.40 hrs, Volume= 6.020 af, Depth= 0.47"
Routed to Reach SP36 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 52,184 | 58 | Meadow, non-grazed, HSG B |
| 695 | 71 | Meadow, non-grazed, HSG C |
| 5,121,405 | 78 | Meadow, non-grazed, HSG D |
| 1,145 | 48 | Brush, Good, HSG B |
| 33,870 | 73 | Brush, Good, HSG D |
| 278,876 | 55 | Woods, Good, HSG B |
| 346,117 | 70 | Woods, Good, HSG C |
| 782,902 | 77 | Woods, Good, HSG D |
| 65,616 | 98 | Paved roads w/curbs & sewers, HSG D |
| 14,651 | 96 | Gravel surface, HSG D |
| 6,697,461 | 77 | Weighted Average |
| 6,631,845 | | 99.02% Pervious Area |
| 65,616 | | 0.98% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.4 | | | | | **Direct Entry, SEE SPREADHSEET** |

## Summary for Subcatchment 37S:

Runoff = 25.26 cfs @ 12.42 hrs, Volume= 3.557 af, Depth= 0.47"
Routed to Reach SP37 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 30,667 | 98 | Impervious |
| | 13,321 | 96 | Gravel surface, HSG A |
| * | 7,485 | 98 | Water |
| | 57,778 | 58 | Meadow, non-grazed, HSG B |
| | 3,215,975 | 78 | Meadow, non-grazed, HSG D |
| | 805 | 48 | Brush, Good, HSG B |
| | 915 | 73 | Brush, Good, HSG D |
| | 76,106 | 55 | Woods, Good, HSG B |
| | 148,513 | 70 | Woods, Good, HSG C |
| | 406,259 | 77 | Woods, Good, HSG D |
| | 3,957,824 | 77 | Weighted Average |
| | 3,919,672 | | 99.04% Pervious Area |
| | 38,152 | | 0.96% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.6 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 38S:

Runoff = 4.83 cfs @ 12.40 hrs, Volume= 0.660 af, Depth= 0.47"
Routed to Reach SP38 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 355,232 | 78 | Meadow, non-grazed, HSG D |
| 379,321 | 77 | Woods, Good, HSG D |
| 734,553 | 77 | Weighted Average |
| 734,553 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 39S:

Runoff = 7.84 cfs @ 12.67 hrs, Volume= 1.615 af, Depth= 0.34"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 113,238 | 30 | Woods, Good, HSG A |
| * | 17,184 | 98 | Impervious Pavement |
| | 149,774 | 30 | Meadow, non-grazed, HSG A |
| | 11,690 | 30 | Brush, Good, HSG A |
| | 30,170 | 70 | Woods, Good, HSG C |
| | 7,231 | 71 | Meadow, non-grazed, HSG C |
| | 194,104 | 77 | Woods, Good, HSG D |
| | 70,193 | 73 | Brush, Good, HSG D |
| * | 2,287 | 96 | Gravel |
| | 1,899,537 | 78 | Meadow, non-grazed, HSG D |
| | 2,495,408 | 73 | Weighted Average |
| | 2,478,224 | | 99.31% Pervious Area |
| | 17,184 | | 0.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.4 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 40S:

Runoff = 17.96 cfs @ 12.53 hrs, Volume= 2.792 af, Depth= 0.51"
Routed to Reach SP40 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,987 | 98 | Impervious Pavement |
| | 171,417 | 77 | Woods, Good, HSG D |
| | 20,992 | 73 | Brush, Good, HSG D |
| | 2,658,700 | 78 | Meadow, non-grazed, HSG D |
| | 2,878,096 | 78 | Weighted Average |
| | 2,851,109 | | 99.06% Pervious Area |
| | 26,987 | | 0.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 41S:

Runoff = 3.07 cfs @ 12.57 hrs, Volume= 0.594 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,863 | 98 | Impervious |
| * | 44,367 | 96 | Gravel |
| | 50,657 | 58 | Meadow, non-grazed, HSG B |
| | 654,398 | 71 | Meadow, non-grazed, HSG C |
| | 153,128 | 78 | Meadow, non-grazed, HSG D |
| | 12,946 | 55 | Woods, Good, HSG B |
| | 30,598 | 70 | Woods, Good, HSG C |
| | 0 | 77 | Woods, Good, HSG D |
| | 33,461 | 61 | >75% Grass cover, Good, HSG B |
| | 6,740 | 74 | >75% Grass cover, Good, HSG C |
| | 1,003,158 | 72 | Weighted Average |
| | 986,295 | | 98.32% Pervious Area |
| | 16,863 | | 1.68% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 46.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 42S:

Runoff = 24.88 cfs @ 13.20 hrs, Volume= 6.752 af, Depth= 0.47"
Routed to Reach SP42 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 20,734 | 98 | Water Surface, HSG A |
| 170,414 | 96 | Gravel surface, HSG A |
| 956,587 | 71 | Meadow, non-grazed, HSG C |
| 5,227,848 | 78 | Meadow, non-grazed, HSG D |
| 287 | 65 | Brush, Good, HSG C |
| 56,930 | 73 | Brush, Good, HSG D |
| 32,944 | 70 | Woods, Good, HSG C |
| 1,046,689 | 77 | Woods, Good, HSG D |
| 7,512,433 | 77 | Weighted Average |
| 7,491,699 | | 99.72% Pervious Area |
| 20,734 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 96.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 43S:

Runoff = 14.50 cfs @ 12.55 hrs, Volume= 2.378 af, Depth= 0.47"
Routed to Reach SP43 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 2,810 | 98 | Impervious |
| | 440,724 | 71 | Meadow, non-grazed, HSG C |
| | 2,172,158 | 78 | Meadow, non-grazed, HSG D |
| | 11,726 | 70 | Woods, Good, HSG C |
| | 18,430 | 77 | Woods, Good, HSG D |
| | 2,645,848 | 77 | Weighted Average |
| | 2,643,038 | | 99.89% Pervious Area |
| | 2,810 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 48.7 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44S:

Runoff = 18.78 cfs @ 13.26 hrs, Volume= 4.972 af, Depth= 0.51"
Routed to Reach SP44 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 136,522 | 98 | Water |
| * | 27,820 | 98 | Impervious |
| * | 4,835 | 96 | Gravel |
| | 146,073 | 58 | Meadow, non-grazed, HSG B |
| | 90,051 | 71 | Meadow, non-grazed, HSG C |
| | 4,232,980 | 78 | Meadow, non-grazed, HSG D |
| | 82,986 | 73 | Brush, Good, HSG D |
| | 6,012 | 55 | Woods, Good, HSG B |
| | 3,850 | 70 | Woods, Good, HSG C |
| | 395,055 | 77 | Woods, Good, HSG D |
| | 5,126,184 | 78 | Weighted Average |
| | 4,961,842 | | 96.79% Pervious Area |
| | 164,342 | | 3.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 97.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44SA:

Runoff = 7.63 cfs @ 12.22 hrs, Volume= 0.762 af, Depth= 0.51"
Routed to Reach SP44A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,459 | 98 | Water |
| * | 21,218 | 98 | Impervious |
| * | 12,958 | 96 | Gravel |
| | 4,574 | 58 | Meadow, non-grazed, HSG B |
| | 57,514 | 71 | Meadow, non-grazed, HSG C |
| | 588,570 | 78 | Meadow, non-grazed, HSG D |
| | 988 | 48 | Brush, Good, HSG B |
| | 17,587 | 73 | Brush, Good, HSG D |
| | 2,222 | 55 | Woods, Good, HSG B |
| | 22,179 | 70 | Woods, Good, HSG C |
| | 49,212 | 77 | Woods, Good, HSG D |
| | 785,481 | 78 | Weighted Average |
| | 755,804 | | 96.22% Pervious Area |
| | 29,677 | | 3.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 25.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 45S:

Runoff = 6.26 cfs @ 12.26 hrs, Volume= 0.654 af, Depth= 0.59"
Routed to nonexistent node SP46

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 49,323 | 98 | Impervious |
| | 33,429 | 77 | Woods, Good, HSG D |
| | 12,134 | 73 | Brush, Good, HSG D |
| * | 720 | 96 | Gravel |
| | 478,790 | 78 | Meadow, non-grazed, HSG D |
| * | 7,562 | 98 | Water |
| | 581,958 | 80 | Weighted Average |
| | 525,073 | | 90.23% Pervious Area |
| | 56,885 | | 9.77% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 46S:

Runoff = 8.67 cfs @ 12.64 hrs, Volume= 1.636 af, Depth= 0.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| Area (sf) | CN | Description |
|---|---|---|
| 367,923 | 77 | Woods, Good, HSG D |
| 229,882 | 55 | Woods, Good, HSG B |
| 1,508,838 | 78 | Meadow, non-grazed, HSG D |
| 27,326 | 73 | Brush, Good, HSG D |
| 2,133,969 | 75 | Weighted Average |
| 2,133,969 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 53.8 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 47S:

Runoff = 12.52 cfs @ 12.65 hrs, Volume= 2.224 af, Depth= 0.51"
Routed to Reach SP47 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-yr Rainfall=2.04"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 23,846 | 98 | Impervious |
| * | 10,900 | 96 | Gravel |
| | 2,186,703 | 78 | Meadow, non-grazed, HSG D |
| | 15,310 | 73 | Brush, Good, HSG D |
| | 56,459 | 77 | Woods, Good, HSG D |
| | 2,293,218 | 78 | Weighted Average |
| | 2,269,372 | | 98.96% Pervious Area |
| | 23,846 | | 1.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 56.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,020,873 sf 2.29% Impervious Runoff Depth=0.71"
Flow Length=3,272' Tc=52.0 min CN=65 Runoff=22.85 cfs 4.106 af

**Subcatchment 3S:** Runoff Area=324,754 sf 0.00% Impervious Runoff Depth=0.67"
Flow Length=836' Tc=23.1 min CN=64 Runoff=4.00 cfs 0.413 af

**Subcatchment 4S:** Runoff Area=16,260,538 sf 1.60% Impervious Runoff Depth=0.96"
Flow Length=7,788' Tc=76.3 min CN=70 Runoff=140.28 cfs 29.834 af

**Subcatchment 5S:** Runoff Area=1,679,234 sf 4.90% Impervious Runoff Depth=1.13"
Flow Length=1,495' Tc=34.3 min CN=73 Runoff=32.00 cfs 3.618 af

**Subcatchment 6S:** Runoff Area=598,623 sf 0.00% Impervious Runoff Depth=1.07"
Flow Length=1,150' Tc=39.7 min CN=72 Runoff=9.64 cfs 1.224 af

**Subcatchment 7S:** Runoff Area=10,734,763 sf 0.11% Impervious Runoff Depth=0.96"
Flow Length=6,505' Tc=76.1 min CN=70 Runoff=93.03 cfs 19.696 af

**Subcatchment 8S:** Runoff Area=1,124,521 sf 2.07% Impervious Runoff Depth=1.01"
Flow Length=2,618' Tc=29.5 min CN=71 Runoff=20.86 cfs 2.180 af

**Subcatchment 9S:** Runoff Area=698,860 sf 9.80% Impervious Runoff Depth=1.31"
Flow Length=1,212' Tc=81.2 min CN=76 Runoff=8.47 cfs 1.748 af

**Subcatchment 10S:** Runoff Area=1,561,270 sf 0.00% Impervious Runoff Depth=1.31"
Flow Length=2,211' Tc=88.4 min CN=76 Runoff=17.83 cfs 3.906 af

**Subcatchment 11S:** Runoff Area=521,344 sf 3.42% Impervious Runoff Depth=1.50"
Flow Length=1,039' Tc=43.1 min CN=79 Runoff=11.92 cfs 1.500 af

**Subcatchment 12S:** Runoff Area=1,437,516 sf 0.62% Impervious Runoff Depth=1.44"
Flow Length=2,388' Tc=104.6 min CN=78 Runoff=16.04 cfs 3.951 af

**Subcatchment 13S:** Runoff Area=2,395,812 sf 0.00% Impervious Runoff Depth=1.19"
Flow Length=2,356' Tc=84.2 min CN=74 Runoff=25.18 cfs 5.431 af

**Subcatchment 14S:** Runoff Area=516,650 sf 1.75% Impervious Runoff Depth=1.31"
Flow Length=935' Tc=36.6 min CN=76 Runoff=11.25 cfs 1.292 af

**Subcatchment 15S:** Runoff Area=329,223 sf 1.24% Impervious Runoff Depth=0.76"
Flow Length=707' Tc=30.6 min CN=66 Runoff=4.01 cfs 0.477 af

**Subcatchment 16S:** Runoff Area=1,134,608 sf 1.12% Impervious Runoff Depth=1.44"
Flow Length=1,611' Tc=58.8 min CN=78 Runoff=19.62 cfs 3.119 af

**Subcatchment 16SA:** Runoff Area=657,258 sf 1.69% Impervious Runoff Depth=1.31"
Tc=39.9 min CN=76 Runoff=13.47 cfs 1.644 af

**Subcatchment 17S:** Runoff Area=6,847,928 sf 0.59% Impervious Runoff Depth=1.37"
Flow Length=4,736' Tc=94.5 min CN=77 Runoff=78.53 cfs 17.966 af

**Subcatchment 18S:** Runoff Area=4,001,602 sf 0.41% Impervious Runoff Depth=1.37"
Flow Length=3,889' Tc=66.4 min CN=77 Runoff=59.93 cfs 10.498 af

**Subcatchment 19S:** Runoff Area=5,028,770 sf 0.59% Impervious Runoff Depth=1.31"
Flow Length=4,703' Tc=80.9 min CN=76 Runoff=61.10 cfs 12.579 af

**Subcatchment 20S:** Runoff Area=2,479,797 sf 2.23% Impervious Runoff Depth=1.19"
Tc=71.1 min CN=74 Runoff=29.55 cfs 5.622 af

**Subcatchment 21S:** Runoff Area=332,609 sf 6.38% Impervious Runoff Depth=0.91"
Flow Length=921' Tc=31.9 min CN=69 Runoff=5.05 cfs 0.577 af

**Subcatchment 22S:** Runoff Area=785,644 sf 0.79% Impervious Runoff Depth=0.91"
Flow Length=1,439' Tc=53.3 min CN=69 Runoff=8.22 cfs 1.362 af

**Subcatchment 23S:** Runoff Area=17,302,399 sf 0.42% Impervious Runoff Depth=1.31"
Flow Length=9,131' Tc=88.7 min CN=76 Runoff=196.79 cfs 43.282 af

**Subcatchment 24S:** Runoff Area=260,905 sf 6.43% Impervious Runoff Depth=1.50"
Flow Length=1,200' Tc=31.2 min CN=79 Runoff=7.47 cfs 0.751 af

**Subcatchment 25S:** Runoff Area=10,643,407 sf 0.28% Impervious Runoff Depth=1.25"
Flow Length=7,278' Tc=71.0 min CN=75 Runoff=135.13 cfs 25.360 af

**Subcatchment 26S:** Runoff Area=823,994 sf 2.72% Impervious Runoff Depth=1.44"
Flow Length=1,347' Tc=43.1 min CN=78 Runoff=17.88 cfs 2.265 af

**Subcatchment 27S:** Runoff Area=1,317,635 sf 4.05% Impervious Runoff Depth=1.01"
Flow Length=3,107' Tc=46.4 min CN=71 Runoff=17.67 cfs 2.554 af

**Subcatchment 28S:** Runoff Area=2,868,130 sf 1.43% Impervious Runoff Depth=1.13"
Flow Length=2,822' Tc=32.9 min CN=73 Runoff=56.32 cfs 6.179 af

**Subcatchment 29S:** Runoff Area=776,122 sf 2.65% Impervious Runoff Depth=1.19"
Flow Length=1,737' Tc=24.4 min CN=74 Runoff=19.81 cfs 1.760 af

**Subcatchment 30S:** Runoff Area=618,450 sf 1.49% Impervious Runoff Depth=1.07"
Flow Length=1,427' Tc=38.4 min CN=72 Runoff=10.18 cfs 1.265 af

**Subcatchment 31S:** Runoff Area=2,981,588 sf 0.44% Impervious Runoff Depth=1.19"
Flow Length=1,885' Tc=60.7 min CN=74 Runoff=39.94 cfs 6.759 af

**Subcatchment 32S:** Runoff Area=4,274,758 sf 0.78% Impervious Runoff Depth=0.67"
Flow Length=3,031' Tc=75.2 min CN=64 Runoff=22.66 cfs 5.439 af

**Subcatchment 33S:** Runoff Area=4,477,391 sf 0.00% Impervious Runoff Depth=0.86"
Flow Length=2,390' Tc=58.6 min CN=68 Runoff=40.42 cfs 7.326 af

**Subcatchment 34S:** Runoff Area=1,658,827 sf 0.00% Impervious Runoff Depth=1.01"
Flow Length=1,443' Tc=42.0 min CN=71 Runoff=23.92 cfs 3.215 af

**Subcatchment 35S:** Runoff Area=2,634,778 sf 10.71% Impervious Runoff Depth=1.31"
Flow Length=3,089' Tc=26.1 min CN=76 Runoff=72.29 cfs 6.591 af

**Subcatchment 36S:** Runoff Area=6,697,461 sf 0.98% Impervious Runoff Depth=1.37"
Tc=38.4 min CN=77 Runoff=149.27 cfs 17.571 af

**Subcatchment 37S:** Runoff Area=3,957,824 sf 0.96% Impervious Runoff Depth=1.37"
Tc=39.6 min CN=77 Runoff=86.22 cfs 10.383 af

**Subcatchment 38S:** Runoff Area=734,553 sf 0.00% Impervious Runoff Depth=1.37"
Tc=38.1 min CN=77 Runoff=16.44 cfs 1.927 af

**Subcatchment 39S:** Runoff Area=2,495,408 sf 0.69% Impervious Runoff Depth=1.13"
Tc=54.4 min CN=73 Runoff=34.06 cfs 5.376 af

**Subcatchment 40S:** Runoff Area=2,878,096 sf 0.94% Impervious Runoff Depth=1.44"
Tc=47.3 min CN=78 Runoff=58.44 cfs 7.911 af

**Subcatchment 41S:** Runoff Area=1,003,158 sf 1.68% Impervious Runoff Depth=1.07"
Tc=46.5 min CN=72 Runoff=14.38 cfs 2.051 af

**Subcatchment 42S:** Runoff Area=7,512,433 sf 0.28% Impervious Runoff Depth=1.37"
Tc=96.3 min CN=77 Runoff=85.06 cfs 19.709 af

**Subcatchment 43S:** Runoff Area=2,645,848 sf 0.11% Impervious Runoff Depth=1.37"
Tc=48.7 min CN=77 Runoff=49.77 cfs 6.941 af

**Subcatchment 44S:** Runoff Area=5,126,184 sf 3.21% Impervious Runoff Depth=1.44"
Tc=97.1 min CN=78 Runoff=60.50 cfs 14.091 af

**Subcatchment 44SA:** Runoff Area=785,481 sf 3.78% Impervious Runoff Depth=1.44"
Tc=25.5 min CN=78 Runoff=24.34 cfs 2.159 af

**Subcatchment 45S:** Runoff Area=581,958 sf 9.77% Impervious Runoff Depth=1.57"
Tc=29.1 min CN=80 Runoff=18.30 cfs 1.751 af

**Subcatchment 46S:** Runoff Area=2,133,969 sf 0.00% Impervious Runoff Depth=1.25"
Tc=53.8 min CN=75 Runoff=33.26 cfs 5.085 af

**Subcatchment 47S:** Runoff Area=2,293,218 sf 1.04% Impervious Runoff Depth=1.44"
Tc=56.5 min CN=78 Runoff=40.83 cfs 6.304 af

**Total Runoff Area = 3,488.434 ac Runoff Volume = 346.749 af Average Runoff Depth = 1.19"**
**98.81% Pervious = 3,446.971 ac 1.19% Impervious = 41.462 ac**

## Summary for Subcatchment 1S:

Runoff = 22.85 cfs @ 12.61 hrs, Volume= 4.106 af, Depth= 0.71"
Routed to Reach SP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 94,531 | 77 | Woods, Good, HSG D |
| | 196,024 | 55 | Woods, Good, HSG B |
| | 9,804 | 48 | Brush, Good, HSG B |
| | 8,870 | 73 | Brush, Good, HSG D |
| * | 69,062 | 98 | Impervious Pavement |
| | 1,853,031 | 58 | Meadow, non-grazed, HSG B |
| | 789,551 | 78 | Meadow, non-grazed, HSG D |
| | 3,020,873 | 65 | Weighted Average |
| | 2,951,811 | | 97.71% Pervious Area |
| | 69,062 | | 2.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 15.8 | 784 | 0.0140 | 0.83 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 9.5 | 2,388 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 52.0 | 3,272 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 4.00 cfs @ 12.20 hrs, Volume= 0.413 af, Depth= 0.67"
Routed to Reach SP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 1,021 | 55 | Woods, Good, HSG B |
| 223,581 | 58 | Meadow, non-grazed, HSG B |
| 1,749 | 73 | Brush, Good, HSG D |
| 969 | 77 | Woods, Good, HSG D |
| 97,434 | 78 | Meadow, non-grazed, HSG D |
| 324,754 | 64 | Weighted Average |
| 324,754 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.6 | 241 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.1 | 445 | 0.0170 | 0.91 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 50 | 0.0300 | 0.87 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.1 | 836 | Total | | | |

## Summary for Subcatchment 4S:

[47] Hint: Peak is 1686% of capacity of segment #4
[47] Hint: Peak is 504% of capacity of segment #7
[47] Hint: Peak is 1008% of capacity of segment #9
[47] Hint: Peak is 435% of capacity of segment #11
[47] Hint: Peak is 4789% of capacity of segment #13
[47] Hint: Peak is 416% of capacity of segment #15

Runoff = 140.28 cfs @ 12.93 hrs, Volume= 29.834 af, Depth= 0.96"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 5,031 | 48 | Brush, Good, HSG B |
| * | 29,184 | 98 | Impervious Pavement |
| * | 9,824 | 98 | Impervious Roof |
| | 708,087 | 58 | Meadow, non-grazed, HSG B |
| | 34,201 | 55 | Woods, Good, HSG B |
| | 34,999 | 73 | Brush, Good, HSG D |
| | 320,256 | 77 | Woods, Good, HSG D |
| | 1,271 | 70 | Woods, Good, HSG C |
| | 170,830 | 71 | Meadow, non-grazed, HSG C |
| * | 2,590 | 96 | Gravel |
| * | 29,099 | 98 | Impervious Pavement |
| * | 287 | 98 | Impervious Roof |
| | 3,181,257 | 78 | Meadow, non-grazed, HSG D |
| | 9,634 | 48 | Brush, Good, HSG B |
| | 868,528 | 55 | Woods, Good, HSG B |
| * | 30,257 | 98 | Impervious Pavement |
| * | 10,455 | 98 | Impervious Roof |
| * | 4,215 | 96 | Gravel |
| | 2,040,672 | 58 | Meadow, non-grazed, HSG B |
| | 38,512 | 78 | Meadow, non-grazed, HSG D |
| | 55,419 | 77 | Woods, Good, HSG D |
| | 334,887 | 78 | Meadow, non-grazed, HSG D |
| | 26,398 | 73 | Brush, Good, HSG D |
| * | 20,636 | 98 | Impervious Pavement |
| | 885,711 | 77 | Woods, Good, HSG D |
| * | 4,759 | 96 | Gravel |
| | 2,163,012 | 78 | Meadow, non-grazed, HSG D |
| * | 10,062 | 98 | Impervious Roof |
| * | 13,878 | 98 | Impervious Pavement |
| * | 13,754 | 96 | Gravel |
| * | 15,803 | 98 | Water |
| | 777,230 | 55 | Woods, Good, HSG B |
| | 16,892 | 48 | Brush, Good, HSG B |
| | 1,287,972 | 58 | Meadow, non-grazed, HSG B |
| * | 72,761 | 98 | Impervious Pavement |
| * | 14,040 | 98 | Impervious Roof |
| * | 1,010 | 96 | Gravel |
| | 91,670 | 77 | Woods, Good, HSG D |
| | 16,841 | 73 | Brush, Good, HSG D |
| | 1,693,872 | 78 | Meadow, non-grazed, HSG D |
| | 55,622 | 55 | Woods, Good, HSG B |
| * | 4,369 | 98 | Impervious Pavement |
| | 643,096 | 58 | Meadow, non-grazed, HSG B |
| | 41,645 | 70 | Woods, Good, HSG C |
| | 470,010 | 71 | Meadow, non-grazed, HSG C |
| | 16,260,538 | 70 | Weighted Average |
| | 15,999,883 | | 98.40% Pervious Area |
| | 260,655 | | 1.60% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** |
| | | | | | Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 277 | 0.0150 | 0.86 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture Kv= 7.0 fps |
| 5.6 | 778 | 0.0240 | 2.32 | | **Shallow Concentrated Flow,** |
| | | | | | Grassed Waterway Kv= 15.0 fps |
| 0.3 | 40 | 0.0050 | 2.65 | 8.32 | **Pipe Channel,** |
| | | | | | 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' |
| | | | | | n= 0.025 Corrugated metal |
| 2.1 | 741 | | 5.90 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.8 | 401 | | 3.76 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 0.0 | 18 | 0.0560 | 8.86 | 27.84 | **Pipe Channel,** |
| | | | | | 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' |
| | | | | | n= 0.025 Corrugated metal |
| 2.3 | 605 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 36 | 0.0140 | 4.43 | 13.92 | **Pipe Channel,** |
| | | | | | 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' |
| | | | | | n= 0.025 Corrugated metal |
| 2.3 | 627 | | 4.46 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 40 | 0.0750 | 10.25 | 32.22 | **Pipe Channel,** |
| | | | | | 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' |
| | | | | | n= 0.025 Corrugated metal |
| 2.1 | 527 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.2 | 40 | 0.0250 | 3.73 | 2.93 | **Pipe Channel,** |
| | | | | | 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' |
| | | | | | n= 0.025 Corrugated metal |
| 4.0 | 593 | | 2.47 | | **Direct Entry, Roadside Ditch** |
| 0.1 | 40 | 0.0250 | 6.87 | 33.72 | **Pipe Channel,** |
| | | | | | 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' |
| | | | | | n= 0.025 Corrugated metal |
| 23.2 | 2,925 | | 2.10 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.3 | 7,788 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 32.00 cfs @ 12.32 hrs, Volume= 3.618 af, Depth= 1.13"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,333 | 96 | Gravel |
| | 136,520 | 70 | Woods, Good, HSG C |
| * | 438 | 98 | Impervious Pavement |
| * | 6,831 | 98 | Impervious Roof |
| * | 7,136 | 98 | Water |
| | 915,909 | 71 | Meadow, non-grazed, HSG C |
| | 57,613 | 55 | Woods, Good, HSG B |
| * | 1,117 | 98 | Impervious Pavement |
| | 3,366 | 48 | Brush, Good, HSG B |
| * | 813 | 96 | Gravel |
| | 60,234 | 58 | Meadow, non-grazed, HSG B |
| * | 66,794 | 98 | Water |
| | 6,417 | 73 | Brush, Good, HSG D |
| * | 3,263 | 96 | Gravel |
| | 517 | 77 | Woods, Good, HSG D |
| | 199,842 | 78 | Meadow, non-grazed, HSG D |
| | 201,091 | 78 | Meadow, non-grazed, HSG D |
| | 1,679,234 | 73 | Weighted Average |
| | 1,596,918 | | 95.10% Pervious Area |
| | 82,316 | | 4.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 12.9 | 842 | 0.0240 | 1.08 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.2 | 311 | | 4.42 | | **Direct Entry, Grassed Waterway** |
| 0.6 | 242 | | 6.54 | | **Direct Entry, Grassed Waterway** |
| 34.3 | 1,495 | Total | | | |

## Summary for Subcatchment 6S:

Runoff = 9.64 cfs @ 12.40 hrs, Volume= 1.224 af, Depth= 1.07"
Routed to Reach SP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 23,122 | 70 | Woods, Good, HSG C |
| 31,419 | 65 | Brush, Good, HSG C |
| 437,478 | 71 | Meadow, non-grazed, HSG C |
| 11,524 | 73 | Brush, Good, HSG D |
| 2,524 | 77 | Woods, Good, HSG D |
| 55,990 | 78 | Meadow, non-grazed, HSG D |
| 1,516 | 70 | Woods, Good, HSG C |
| 2,812 | 77 | Woods, Good, HSG D |
| 20,186 | 78 | Meadow, non-grazed, HSG D |
| 12,052 | 71 | Meadow, non-grazed, HSG C |
| 598,623 | 72 | Weighted Average |
| 598,623 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 4.3 | 256 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.5 | 341 | 0.1030 | 2.25 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.4 | 316 | 0.1870 | 2.16 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.8 | 137 | | 1.26 | | **Direct Entry, Grassed Waterway** |
| 39.7 | 1,150 | Total | | | |

## Summary for Subcatchment 7S:

Runoff = 93.03 cfs @ 12.93 hrs, Volume= 19.696 af, Depth= 0.96"
Routed to Reach SP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,822,055 | 58 | Meadow, non-grazed, HSG B |
| | 23,489 | 48 | Brush, Good, HSG B |
| | 640,040 | 55 | Woods, Good, HSG B |
| | 2,269,487 | 71 | Meadow, non-grazed, HSG C |
| | 2,183 | 65 | Brush, Good, HSG C |
| | 137,505 | 70 | Woods, Good, HSG C |
| | 2,942,616 | 78 | Meadow, non-grazed, HSG D |
| | 53,119 | 73 | Brush, Good, HSG D |
| | 1,829,743 | 77 | Woods, Good, HSG D |
| * | 11,894 | 98 | Impervious |
| * | 2,632 | 96 | Gravel |
| | 10,734,763 | 70 | Weighted Average |
| | 10,722,869 | | 99.89% Pervious Area |
| | 11,894 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 449 | 0.0390 | 1.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.2 | 512 | 0.0220 | 1.04 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 20.3 | 945 | 0.0240 | 0.77 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 192 | 0.0310 | 0.88 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 14.9 | 3,312 | | 3.70 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.1 | 284 | 0.0530 | 1.15 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.8 | 711 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.1 | 6,505 | Total | | | |

## Summary for Subcatchment 8S:

Runoff = 20.86 cfs @ 12.26 hrs, Volume= 2.180 af, Depth= 1.01"
Routed to Reach SP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 0 | 55 | Woods, Good, HSG B |
| * | 1,030 | 98 | Impervious Pavement |
| | 27,402 | 58 | Meadow, non-grazed, HSG B |
| | 15,462 | 77 | Woods, Good, HSG D |
| * | 6,130 | 98 | Impervious Pavement |
| | 200,339 | 78 | Meadow, non-grazed, HSG D |
| | 25,785 | 55 | Woods, Good, HSG B |
| * | 1,580 | 96 | Gravel |
| * | 5,152 | 98 | Impervious Pavement |
| | 191,169 | 58 | Meadow, non-grazed, HSG B |
| * | 7,435 | 98 | Impervious Pavement |
| | 9,470 | 77 | Woods, Good, HSG D |
| | 423,047 | 78 | Meadow, non-grazed, HSG D |
| | 12,817 | 65 | Brush, Good, HSG C |
| * | 2,902 | 98 | Impervious Pavement |
| * | 3,771 | 96 | Gravel |
| * | 670 | 98 | Impervious Roof |
| | 190,360 | 58 | Meadow, non-grazed, HSG B |
| | 1,124,521 | 71 | Weighted Average |
| | 1,101,202 | | 97.93% Pervious Area |
| | 23,319 | | 2.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.2 | 100 | 0.0420 | 0.14 | | **Sheet Flow,** |
| | | | | | Grass: Dense n= 0.240 P2= 2.40" |
| 6.0 | 364 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 1,017 | | 2.68 | | **Direct Entry, Roadside Ditch** |
| 5.0 | 1,137 | | 3.82 | | **Direct Entry, Roadside Ditch** |
| 29.5 | 2,618 | Total | | | |

## Summary for Subcatchment 9S:

Runoff = 8.47 cfs @ 12.92 hrs, Volume= 1.748 af, Depth= 1.31"
Routed to Reach SP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 46,629 | 98 | Water |
| * | 6,554 | 98 | Impervious Pavement |
| | 424,080 | 78 | Meadow, non-grazed, HSG D |
| | 2,058 | 55 | Woods, Good, HSG B |
| | 7,321 | 48 | Brush, Good, HSG B |
| * | 10,739 | 98 | Water |
| * | 1,356 | 98 | Impervious Pavement |
| | 110,953 | 58 | Meadow, non-grazed, HSG B |
| * | 3,190 | 98 | Impervious Pavement |
| | 19,729 | 73 | Brush, Good, HSG D |
| | 66,251 | 78 | Meadow, non-grazed, HSG D |
| | 698,860 | 76 | Weighted Average |
| | 630,392 | | 90.20% Pervious Area |
| | 68,468 | | 9.80% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.0 | 540 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.6 | 572 | | 1.11 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 81.2 | 1,212 | Total | | | |

## Summary for Subcatchment 10S:

Runoff = 17.83 cfs @ 13.05 hrs, Volume= 3.906 af, Depth= 1.31"
Routed to Reach SP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 35,373 | 55 | Woods, Good, HSG B |
| 4,798 | 48 | Brush, Good, HSG B |
| 92,207 | 58 | Meadow, non-grazed, HSG B |
| 87,496 | 73 | Brush, Good, HSG D |
| 13,364 | 77 | Woods, Good, HSG D |
| 1,328,032 | 78 | Meadow, non-grazed, HSG D |
| 1,561,270 | 76 | Weighted Average |
| 1,561,270 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 16.9 | 388 | 0.0030 | 0.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 33 | 0.0610 | 1.23 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 165 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.2 | 310 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 8.2 | 920 | | 1.88 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.5 | 295 | | 3.39 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 88.4 | 2,211 | Total | | | |

## Summary for Subcatchment 11S:

Runoff = 11.92 cfs @ 12.42 hrs, Volume= 1.500 af, Depth= 1.50"
Routed to Reach SP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 17,843 | 98 | Paved parking, HSG D |
| 501,616 | 78 | Meadow, non-grazed, HSG D |
| 1,885 | 73 | Brush, Good, HSG D |
| 521,344 | 79 | Weighted Average |
| 503,501 | | 96.58% Pervious Area |
| 17,843 | | 3.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.2 | 100 | 0.0120 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 11.8 | 521 | 0.0110 | 0.73 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.1 | 418 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,039 | Total | | | |

## Summary for Subcatchment 12S:

Runoff = 16.04 cfs @ 13.26 hrs, Volume= 3.951 af, Depth= 1.44"
Routed to Reach SP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,897 | 98 | Impervious |
| | 8,690 | 58 | Meadow, non-grazed, HSG B |
| | 1,313,095 | 78 | Meadow, non-grazed, HSG D |
| | 5,821 | 73 | Brush, Good, HSG D |
| | 101,013 | 77 | Woods, Good, HSG D |
| | 1,437,516 | 78 | Weighted Average |
| | 1,428,619 | | 99.38% Pervious Area |
| | 8,897 | | 0.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 30.7 | 100 | 0.0470 | 0.05 | | **Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.40" |
| 25.9 | 601 | 0.0060 | 0.39 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 48.0 | 1,687 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 104.6 | 2,388 | Total | | | |

## Summary for Subcatchment 13S:

Runoff = 25.18 cfs @ 13.00 hrs, Volume= 5.431 af, Depth= 1.19"
Routed to Reach SP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 279,893 | 58 | Meadow, non-grazed, HSG B |
| 1,558,214 | 78 | Meadow, non-grazed, HSG D |
| 424 | 48 | Brush, Good, HSG B |
| 77,097 | 73 | Brush, Good, HSG D |
| 142,209 | 55 | Woods, Good, HSG B |
| 337,975 | 77 | Woods, Good, HSG D |
| 2,395,812 | 74 | Weighted Average |
| 2,395,812 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0230 | 0.11 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 48.9 | 1,838 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 418 | 0.0050 | 0.35 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 84.2 | 2,356 | Total | | | |

## Summary for Subcatchment 14S:

Runoff = 11.25 cfs @ 12.34 hrs, Volume= 1.292 af, Depth= 1.31"
Routed to Reach SP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,018 | 98 | Impervious |
| | 70,714 | 58 | Meadow, non-grazed, HSG B |
| | 428,883 | 78 | Meadow, non-grazed, HSG D |
| | 744 | 48 | Brush, Good, HSG B |
| | 189 | 73 | Brush, Good, HSG D |
| | 7,102 | 77 | Woods, Good, HSG D |
| | 516,650 | 76 | Weighted Average |
| | 507,632 | | 98.25% Pervious Area |
| | 9,018 | | 1.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.1 | 835 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.6 | 935 | Total | | | |

## Summary for Subcatchment 15S:

Runoff = 4.01 cfs @ 12.30 hrs, Volume= 0.477 af, Depth= 0.76"
Routed to Reach SP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 4,081 | 98 | Impervious |
| | 181,283 | 58 | Meadow, non-grazed, HSG B |
| | 126,101 | 78 | Meadow, non-grazed, HSG D |
| | 6,560 | 48 | Brush, Good, HSG B |
| | 2,092 | 73 | Brush, Good, HSG D |
| | 5,023 | 55 | Woods, Good, HSG B |
| | 4,083 | 77 | Woods, Good, HSG D |
| | 329,223 | 66 | Weighted Average |
| | 325,142 | | 98.76% Pervious Area |
| | 4,081 | | 1.24% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.9 | 100 | 0.0220 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 387 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.3 | 220 | 0.0040 | 0.44 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 30.6 | 707 | Total | | | |

## Summary for Subcatchment 16S:

Runoff = 19.62 cfs @ 12.62 hrs, Volume= 3.119 af, Depth= 1.44"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,714 | 98 | Impervious |
| | 25,066 | 71 | Meadow, non-grazed, HSG C |
| | 938,415 | 78 | Meadow, non-grazed, HSG D |
| | 3,358 | 73 | Brush, Good, HSG D |
| | 863 | 70 | Woods, Good, HSG C |
| | 154,192 | 77 | Woods, Good, HSG D |
| | 1,134,608 | 78 | Weighted Average |
| | 1,121,894 | | 98.88% Pervious Area |
| | 12,714 | | 1.12% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.0 | 100 | 0.0170 | 0.06 | | **Sheet Flow,**<br>Grass: Bermuda n= 0.410 P2= 2.40" |
| 3.8 | 142 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 26.0 | 1,035 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.0 | 334 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.8 | 1,611 | Total | | | |

## Summary for Subcatchment 16SA:

Runoff = 13.47 cfs @ 12.38 hrs, Volume= 1.644 af, Depth= 1.31"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,093 | 98 | Impervious |
| | 70,093 | 58 | Meadow, non-grazed, HSG B |
| | 359,929 | 78 | Meadow, non-grazed, HSG D |
| | 259 | 48 | Brush, Good, HSG B |
| | 14,806 | 73 | Brush, Good, HSG D |
| | 0 | 70 | Woods, Good, HSG C |
| | 201,078 | 77 | Woods, Good, HSG D |
| | 657,258 | 76 | Weighted Average |
| | 646,165 | | 98.31% Pervious Area |
| | 11,093 | | 1.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.9 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 17S:

Runoff = 78.53 cfs @ 13.12 hrs, Volume= 17.966 af, Depth= 1.37"
Routed to Reach SP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 22,601 | 98 | Water Surface, HSG A |
| * | 17,632 | 98 | Impervious |
| | 252,955 | 71 | Meadow, non-grazed, HSG C |
| | 4,937,352 | 78 | Meadow, non-grazed, HSG D |
| | 16,810 | 65 | Brush, Good, HSG C |
| | 130,011 | 73 | Brush, Good, HSG D |
| | 111,819 | 70 | Woods, Good, HSG C |
| | 1,358,748 | 77 | Woods, Good, HSG D |
| | 6,847,928 | 77 | Weighted Average |
| | 6,807,695 | | 99.41% Pervious Area |
| | 40,233 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.1 | 50 | 0.0300 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 10.9 | 50 | 0.0140 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 32.6 | 2,373 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 33.8 | 1,418 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.1 | 845 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 94.5 | 4,736 | Total | | | |

## Summary for Subcatchment 18S:

Runoff = 59.93 cfs @ 12.74 hrs, Volume= 10.498 af, Depth= 1.37"
Routed to Reach SP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,953 | 98 | Water Surface, HSG A |
| * | 13,432 | 98 | Impervious |
| | 5,975 | 58 | Meadow, non-grazed, HSG B |
| | 29,944 | 71 | Meadow, non-grazed, HSG C |
| | 2,207,221 | 78 | Meadow, non-grazed, HSG D |
| | 157,865 | 73 | Brush, Good, HSG D |
| | 23,440 | 55 | Woods, Good, HSG B |
| | 321,869 | 70 | Woods, Good, HSG C |
| | 1,238,903 | 77 | Woods, Good, HSG D |
| | 4,001,602 | 77 | Weighted Average |
| | 3,985,217 | | 99.59% Pervious Area |
| | 16,385 | | 0.41% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.8 | 100 | 0.0150 | 0.06 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 6.8 | 205 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.6 | 2,144 | 0.0920 | 1.52 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.2 | 1,440 | | 2.92 | | **Direct Entry, Ditch** |
| 66.4 | 3,889 | Total | | | |

## Summary for Subcatchment 19S:

Runoff = 61.10 cfs @ 12.95 hrs, Volume= 12.579 af, Depth= 1.31"
Routed to Reach SP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,609 | 98 | Impervious |
| | 21,503 | 96 | Gravel surface, HSG A |
| | 84,734 | 58 | Meadow, non-grazed, HSG B |
| | 89,335 | 71 | Meadow, non-grazed, HSG C |
| | 2,422,408 | 78 | Meadow, non-grazed, HSG D |
| | 10,082 | 48 | Brush, Good, HSG B |
| | 74,495 | 73 | Brush, Good, HSG D |
| | 16,971 | 55 | Woods, Good, HSG B |
| | 681,805 | 70 | Woods, Good, HSG C |
| | 1,597,828 | 77 | Woods, Good, HSG D |
| | 5,028,770 | 76 | Weighted Average |
| | 4,999,161 | | 99.41% Pervious Area |
| | 29,609 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.7 | 100 | 0.0100 | 0.05 | | **Sheet Flow,**<br>Woods: Light underbrush n= 0.400 P2= 2.40" |
| 21.4 | 1,915 | 0.0890 | 1.49 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 6.3 | 706 | 0.0720 | 1.88 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 3.7 | 109 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.9 | 244 | 0.0410 | 1.42 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 7.2 | 706 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 6.7 | 923 | | 2.30 | | **Direct Entry, Small Tributary & Swamps w/ Channels** |
| 80.9 | 4,703 | Total | | | |

## Summary for Subcatchment 20S:

Runoff = 29.55 cfs @ 12.83 hrs, Volume= 5.622 af, Depth= 1.19"
Routed to Reach SP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 16,368 | 98 | Water Surface, HSG A |
| * | 38,886 | 98 | Impervious |
| | 503 | 96 | Gravel surface, HSG A |
| | 99,447 | 30 | Meadow, non-grazed, HSG A |
| | 58,596 | 58 | Meadow, non-grazed, HSG B |
| | 130,201 | 71 | Meadow, non-grazed, HSG C |
| | 1,680,681 | 78 | Meadow, non-grazed, HSG D |
| | 21,162 | 73 | Brush, Good, HSG D |
| | 131,716 | 55 | Woods, Good, HSG B |
| | 6,015 | 70 | Woods, Good, HSG C |
| | 296,222 | 77 | Woods, Good, HSG D |
| | 2,479,797 | 74 | Weighted Average |
| | 2,424,543 | | 97.77% Pervious Area |
| | 55,254 | | 2.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 71.1 | | | | | **Direct Entry, SEE SPREDSHEET** |

## Summary for Subcatchment 21S:

Runoff = 5.05 cfs @ 12.30 hrs, Volume= 0.577 af, Depth= 0.91"
Routed to Reach SP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 28,890 | 30 | Meadow, non-grazed, HSG A |
| 262,110 | 71 | Meadow, non-grazed, HSG C |
| 12,438 | 78 | Meadow, non-grazed, HSG D |
| 683 | 30 | Brush, Good, HSG A |
| 5,947 | 65 | Brush, Good, HSG C |
| 1,322 | 30 | Woods, Good, HSG A |
| 21,219 | 98 | Paved roads w/curbs & sewers, HSG A |
| 332,609 | 69 | Weighted Average |
| 311,390 | | 93.62% Pervious Area |
| 21,219 | | 6.38% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0410 | 0.13 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 19.5 | 821 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 31.9 | 921 | Total | | | |

## Summary for Subcatchment 22S:

Runoff = 8.22 cfs @ 12.60 hrs, Volume= 1.362 af, Depth= 0.91"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 87,197 | 30 | Meadow, non-grazed, HSG A |
| 418,867 | 71 | Meadow, non-grazed, HSG C |
| 134,602 | 78 | Meadow, non-grazed, HSG D |
| 814 | 65 | Brush, Good, HSG C |
| 7,253 | 73 | Brush, Good, HSG D |
| 843 | 30 | Woods, Good, HSG A |
| 3,389 | 70 | Woods, Good, HSG C |
| 126,479 | 77 | Woods, Good, HSG D |
| 6,200 | 98 | Paved roads w/curbs & sewers, HSG A |
| 785,644 | 69 | Weighted Average |
| 779,444 | | 99.21% Pervious Area |
| 6,200 | | 0.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 22.4 | 1,072 | 0.0130 | 0.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 83 | 0.1330 | 1.82 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.4 | 184 | | 2.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 53.3 | 1,439 | Total | | | |

## Summary for Subcatchment 23S:

Runoff = 196.79 cfs @ 13.08 hrs, Volume= 43.282 af, Depth= 1.31"
Routed to Reach SP23 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 33,228 | 30 | Meadow, non-grazed, HSG A |
| 494,460 | 71 | Meadow, non-grazed, HSG C |
| 7,349,351 | 78 | Meadow, non-grazed, HSG D |
| 299,742 | 65 | Brush, Good, HSG C |
| 1,788,044 | 73 | Brush, Good, HSG D |
| 1,493,479 | 70 | Woods, Good, HSG C |
| 5,745,558 | 77 | Woods, Good, HSG D |
| 73,510 | 98 | Paved roads w/curbs & sewers, HSG D |
| 25,027 | 96 | Gravel surface, HSG D |
| 17,302,399 | 76 | Weighted Average |
| 17,228,889 | | 99.58% Pervious Area |
| 73,510 | | 0.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.4 | 100 | 0.0420 | 0.09 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 22.2 | 1,941 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.2 | 806 | 0.0580 | 1.20 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.6 | 1,740 | | 2.49 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.2 | 1,229 | | 4.93 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 9.5 | 1,895 | | 3.32 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 3.8 | 650 | | 2.82 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 7.8 | 770 | | 1.64 | | **Direct Entry, Roadside Ditch** |
| 88.7 | 9,131 | Total | | | |

## Summary for Subcatchment 24S:

Runoff = 7.47 cfs @ 12.27 hrs, Volume= 0.751 af, Depth= 1.50"
Routed to Reach SP24 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 226,229 | 78 | Meadow, non-grazed, HSG D |
| 7,721 | 73 | Brush, Good, HSG D |
| 10,176 | 77 | Woods, Good, HSG D |
| 16,779 | 98 | Paved roads w/curbs & sewers, HSG D |
| 260,905 | 79 | Weighted Average |
| 244,126 | | 93.57% Pervious Area |
| 16,779 | | 6.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.1 | 100 | 0.0250 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 14.0 | 830 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.1 | 270 | | 2.17 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 31.2 | 1,200 | Total | | | |

## Summary for Subcatchment 25S:

Runoff = 135.13 cfs @ 12.83 hrs, Volume= 25.360 af, Depth= 1.25"
Routed to Reach SP25 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 816,850 | 58 | Meadow, non-grazed, HSG B |
| 955,101 | 71 | Meadow, non-grazed, HSG C |
| 5,104,595 | 78 | Meadow, non-grazed, HSG D |
| 18,372 | 48 | Brush, Good, HSG B |
| 265,288 | 73 | Brush, Good, HSG D |
| 189,511 | 55 | Woods, Good, HSG B |
| 3,244,843 | 77 | Woods, Good, HSG D |
| 29,278 | 98 | Paved roads w/curbs & sewers, HSG D |
| 19,569 | 96 | Gravel surface, HSG D |
| 10,643,407 | 75 | Weighted Average |
| 10,614,129 | | 99.72% Pervious Area |
| 29,278 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.9 | 1,281 | 0.0510 | 1.13 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.8 | 640 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 17.1 | 4,093 | | 3.98 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.6 | 482 | | 1.76 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.8 | 682 | | 2.39 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 71.0 | 7,278 | Total | | | |

## Summary for Subcatchment 26S:

Runoff = 17.88 cfs @ 12.42 hrs, Volume= 2.265 af, Depth= 1.44"
Routed to Reach SP26 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 75,400 | 77 | Woods, Good, HSG D |
| * | 4,254 | 98 | Water |
| | 50,954 | 71 | Meadow, non-grazed, HSG C |
| * | 18,174 | 98 | Impervious Pavement |
| | 675,212 | 78 | Meadow, non-grazed, HSG D |
| | 823,994 | 78 | Weighted Average |
| | 801,566 | | 97.28% Pervious Area |
| | 22,428 | | 2.72% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 527 | | 1.64 | | **Direct Entry, Ditch** |
| 19.2 | 720 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,347 | Total | | | |

## Summary for Subcatchment 27S:

Runoff = 17.67 cfs @ 12.49 hrs, Volume= 2.554 af, Depth= 1.01"
Routed to Reach SP27 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 102,395 | 30 | Meadow, non-grazed, HSG A |
| 70,249 | 58 | Meadow, non-grazed, HSG B |
| 356,229 | 71 | Meadow, non-grazed, HSG C |
| 594,316 | 78 | Meadow, non-grazed, HSG D |
| 15,001 | 48 | Brush, Good, HSG B |
| 136 | 65 | Brush, Good, HSG C |
| 35,121 | 73 | Brush, Good, HSG D |
| 1,761 | 30 | Woods, Good, HSG A |
| 10,015 | 55 | Woods, Good, HSG B |
| 44,190 | 70 | Woods, Good, HSG C |
| 27,054 | 77 | Woods, Good, HSG D |
| 53,425 | 98 | Paved roads w/curbs & sewers, HSG A |
| 7,743 | 96 | Gravel surface, HSG A |
| 1,317,635 | 71 | Weighted Average |
| 1,264,210 | | 95.95% Pervious Area |
| 53,425 | | 4.05% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 7.4 | 973 | 0.0970 | 2.18 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.4 | 548 | 0.0820 | 1.43 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.0 | 152 | 0.0330 | 1.27 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 12.9 | 824 | 0.0230 | 1.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 510 | | 1.34 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 46.4 | 3,107 | Total | | | |

## Summary for Subcatchment 28S:

Runoff = 56.32 cfs @ 12.30 hrs, Volume= 6.179 af, Depth= 1.13"
Routed to Reach SP28 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 148,045 | 58 | Meadow, non-grazed, HSG B |
| | 1,391,071 | 71 | Meadow, non-grazed, HSG C |
| | 1,142,501 | 78 | Meadow, non-grazed, HSG D |
| | 16,837 | 48 | Brush, Good, HSG B |
| | 158 | 65 | Brush, Good, HSG C |
| | 36,741 | 73 | Brush, Good, HSG D |
| | 39,665 | 55 | Woods, Good, HSG B |
| | 794 | 70 | Woods, Good, HSG C |
| | 51,395 | 77 | Woods, Good, HSG D |
| * | 40,923 | 98 | Impervious Surface |
| | 2,868,130 | 73 | Weighted Average |
| | 2,827,207 | | 98.57% Pervious Area |
| | 40,923 | | 1.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** |
| | | | | | Grass: Dense n= 0.240 P2= 2.40" |
| 2.3 | 163 | 0.0290 | 1.19 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture Kv= 7.0 fps |
| 11.0 | 2,559 | | 3.88 | | **Direct Entry, Roadside Ditch** |
| 32.9 | 2,822 | Total | | | |

## Summary for Subcatchment 29S:

Runoff = 19.81 cfs @ 12.19 hrs, Volume= 1.760 af, Depth= 1.19"
Routed to Reach SP29 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,206 | 70 | Woods, Good, HSG C |
| * | 7,569 | 98 | Impervious Pavement |
| * | 4,117 | 98 | Impervious Roof |
| * | 5,127 | 96 | Gravel |
| | 247,913 | 71 | Meadow, non-grazed, HSG C |
| | 11,168 | 55 | Woods, Good, HSG B |
| | 740 | 65 | Brush, Good, HSG C |
| | 9,072 | 48 | Brush, Good, HSG B |
| * | 428 | 98 | Impervious Roof |
| | 56,539 | 58 | Meadow, non-grazed, HSG B |
| * | 8,416 | 98 | Impervious Pavement |
| | 16,068 | 77 | Woods, Good, HSG D |
| | 374,759 | 78 | Meadow, non-grazed, HSG D |
| | 776,122 | 74 | Weighted Average |
| | 755,592 | | 97.35% Pervious Area |
| | 20,530 | | 2.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.3 | 100 | 0.0650 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 0.5 | 63 | 0.0950 | 2.16 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 31 | 0.1290 | 1.80 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.1 | 612 | 0.0570 | 1.67 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.1 | 31 | 0.6100 | 3.91 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 7.1 | 900 | | 2.12 | | **Direct Entry, Roadside Ditch** |
| 24.4 | 1,737 | Total | | | |

## Summary for Subcatchment 30S:

Runoff = 10.18 cfs @ 12.38 hrs, Volume= 1.265 af, Depth= 1.07"
Routed to Reach SP30 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 511,468 | 71 | Meadow, non-grazed, HSG C |
| | 80,980 | 78 | Meadow, non-grazed, HSG D |
| | 16,758 | 70 | Woods, Good, HSG C |
| * | 9,244 | 98 | Impervious Surface |
| | 618,450 | 72 | Weighted Average |
| | 609,206 | | 98.51% Pervious Area |
| | 9,244 | | 1.49% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 10.4 | 1,152 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 1.3 | 175 | | 2.28 | | **Direct Entry, Roadside Ditch** |
| 38.4 | 1,427 | Total | | | |

## Summary for Subcatchment 31S:

Runoff = 39.94 cfs @ 12.67 hrs, Volume= 6.759 af, Depth= 1.19"
Routed to Reach SP31 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 66,905 | 58 | Meadow, non-grazed, HSG B |
| | 1,185,943 | 71 | Meadow, non-grazed, HSG C |
| | 1,398,406 | 78 | Meadow, non-grazed, HSG D |
| | 1,947 | 73 | Brush, Good, HSG D |
| | 84,560 | 55 | Woods, Good, HSG B |
| | 17,524 | 70 | Woods, Good, HSG C |
| | 213,262 | 77 | Woods, Good, HSG D |
| * | 13,041 | 98 | Impervious Surface |
| | 2,981,588 | 74 | Weighted Average |
| | 2,968,547 | | 99.56% Pervious Area |
| | 13,041 | | 0.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 35.2 | 100 | 0.0030 | 0.05 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 6.2 | 219 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 8.4 | 252 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 6.7 | 592 | 0.0440 | 1.47 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 4.2 | 722 | | 2.87 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 60.7 | 1,885 | Total | | | |

## Summary for Subcatchment 32S:

Runoff = 22.66 cfs @ 12.96 hrs, Volume= 5.439 af, Depth= 0.67"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,541,060 | 58 | Meadow, non-grazed, HSG B |
| | 716,554 | 71 | Meadow, non-grazed, HSG C |
| | 517,326 | 78 | Meadow, non-grazed, HSG D |
| | 869 | 48 | Brush, Good, HSG B |
| | 3,094 | 65 | Brush, Good, HSG C |
| | 4,465 | 73 | Brush, Good, HSG D |
| | 200,046 | 55 | Woods, Good, HSG B |
| | 46,472 | 70 | Woods, Good, HSG C |
| | 208,119 | 77 | Woods, Good, HSG D |
| * | 33,483 | 98 | Impervious Surface |
| | 3,270 | 96 | Gravel surface, HSG A |
| | 4,274,758 | 64 | Weighted Average |
| | 4,241,275 | | 99.22% Pervious Area |
| | 33,483 | | 0.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0200 | 0.10 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 848 | 0.1000 | 2.21 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 52.3 | 2,083 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 75.2 | 3,031 | Total | | | |

## Summary for Subcatchment 33S:

Runoff = 40.42 cfs @ 12.69 hrs, Volume= 7.326 af, Depth= 0.86"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 1,722,412 | 58 | Meadow, non-grazed, HSG B |
| 1,542,409 | 78 | Meadow, non-grazed, HSG D |
| 1,381 | 73 | Brush, Good, HSG D |
| 384,753 | 55 | Woods, Good, HSG B |
| 826,436 | 77 | Woods, Good, HSG D |
| 4,477,391 | 68 | Weighted Average |
| 4,477,391 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.1 | 100 | 0.0340 | 0.08 | | **Sheet Flow,**<br>Woods: Light underbrush n= 0.400 P2= 2.40" |
| 24.6 | 932 | 0.0160 | 0.63 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 12.8 | 1,157 | 0.0460 | 1.50 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 60 | 0.3120 | 2.79 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 0.7 | 141 | | 3.19 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.6 | 2,390 | Total | | | |

## Summary for Subcatchment 34S:

Runoff = 23.92 cfs @ 12.43 hrs, Volume= 3.215 af, Depth= 1.01"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 20,254 | 58 | Meadow, non-grazed, HSG B |
| 937,330 | 78 | Meadow, non-grazed, HSG D |
| 16,371 | 48 | Brush, Good, HSG B |
| 35,437 | 73 | Brush, Good, HSG D |
| 429,230 | 55 | Woods, Good, HSG B |
| 220,205 | 77 | Woods, Good, HSG D |
| 1,658,827 | 71 | Weighted Average |
| 1,658,827 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.5 | 100 | 0.0320 | 0.08 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 2.9 | 130 | 0.0220 | 0.74 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 18.3 | 1,058 | 0.0190 | 0.96 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 155 | | 8.93 | | **Direct Entry, Small tributary & Swamp w/channels** |
| 42.0 | 1,443 | Total | | | |

## Summary for Subcatchment 35S:

Runoff = 72.29 cfs @ 12.21 hrs, Volume= 6.591 af, Depth= 1.31"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 32,311 | 58 | Meadow, non-grazed, HSG B |
| 36,347 | 71 | Meadow, non-grazed, HSG C |
| 1,445,641 | 78 | Meadow, non-grazed, HSG D |
| 26,860 | 73 | Brush, Good, HSG D |
| 450,341 | 55 | Woods, Good, HSG B |
| 79,608 | 70 | Woods, Good, HSG C |
| 204,736 | 77 | Woods, Good, HSG D |
| 282,102 | 98 | Paved roads w/curbs & sewers, HSG D |
| 76,832 | 96 | Gravel surface, HSG D |
| 2,634,778 | 76 | Weighted Average |
| 2,352,676 | | 89.29% Pervious Area |
| 282,102 | | 10.71% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.4 | 100 | 0.0050 | 0.68 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40" |
| 2.6 | 755 | 0.0590 | 4.93 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 2.5 | 438 | | 2.91 | | **Direct Entry,** |
| 17.6 | 1,445 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 351 | | 5.94 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 26.1 | 3,089 | Total | | | |

## Summary for Subcatchment 36S:

Runoff = 149.27 cfs @ 12.36 hrs, Volume= 17.571 af, Depth= 1.37"
Routed to Reach SP36 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 52,184 | 58 | Meadow, non-grazed, HSG B |
| 695 | 71 | Meadow, non-grazed, HSG C |
| 5,121,405 | 78 | Meadow, non-grazed, HSG D |
| 1,145 | 48 | Brush, Good, HSG B |
| 33,870 | 73 | Brush, Good, HSG D |
| 278,876 | 55 | Woods, Good, HSG B |
| 346,117 | 70 | Woods, Good, HSG C |
| 782,902 | 77 | Woods, Good, HSG D |
| 65,616 | 98 | Paved roads w/curbs & sewers, HSG D |
| 14,651 | 96 | Gravel surface, HSG D |
| 6,697,461 | 77 | Weighted Average |
| 6,631,845 | | 99.02% Pervious Area |
| 65,616 | | 0.98% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.4 | | | | | **Direct Entry, SEE SPREADHSEET** |

## Summary for Subcatchment 37S:

Runoff = 86.22 cfs @ 12.38 hrs, Volume= 10.383 af, Depth= 1.37"
Routed to Reach SP37 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 30,667 | 98 | Impervious |
| | 13,321 | 96 | Gravel surface, HSG A |
| * | 7,485 | 98 | Water |
| | 57,778 | 58 | Meadow, non-grazed, HSG B |
| | 3,215,975 | 78 | Meadow, non-grazed, HSG D |
| | 805 | 48 | Brush, Good, HSG B |
| | 915 | 73 | Brush, Good, HSG D |
| | 76,106 | 55 | Woods, Good, HSG B |
| | 148,513 | 70 | Woods, Good, HSG C |
| | 406,259 | 77 | Woods, Good, HSG D |
| | 3,957,824 | 77 | Weighted Average |
| | 3,919,672 | | 99.04% Pervious Area |
| | 38,152 | | 0.96% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.6 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 38S:

Runoff = 16.44 cfs @ 12.36 hrs, Volume= 1.927 af, Depth= 1.37"
Routed to Reach SP38 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 355,232 | 78 | Meadow, non-grazed, HSG D |
| 379,321 | 77 | Woods, Good, HSG D |
| 734,553 | 77 | Weighted Average |
| 734,553 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 39S:

Runoff = 34.06 cfs @ 12.59 hrs, Volume= 5.376 af, Depth= 1.13"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 113,238 | 30 | Woods, Good, HSG A |
| * | 17,184 | 98 | Impervious Pavement |
| | 149,774 | 30 | Meadow, non-grazed, HSG A |
| | 11,690 | 30 | Brush, Good, HSG A |
| | 30,170 | 70 | Woods, Good, HSG C |
| | 7,231 | 71 | Meadow, non-grazed, HSG C |
| | 194,104 | 77 | Woods, Good, HSG D |
| | 70,193 | 73 | Brush, Good, HSG D |
| * | 2,287 | 96 | Gravel |
| | 1,899,537 | 78 | Meadow, non-grazed, HSG D |
| | 2,495,408 | 73 | Weighted Average |
| | 2,478,224 | | 99.31% Pervious Area |
| | 17,184 | | 0.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.4 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 40S:

Runoff = 58.44 cfs @ 12.47 hrs, Volume= 7.911 af, Depth= 1.44"
Routed to Reach SP40 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,987 | 98 | Impervious Pavement |
| | 171,417 | 77 | Woods, Good, HSG D |
| | 20,992 | 73 | Brush, Good, HSG D |
| | 2,658,700 | 78 | Meadow, non-grazed, HSG D |
| | 2,878,096 | 78 | Weighted Average |
| | 2,851,109 | | 99.06% Pervious Area |
| | 26,987 | | 0.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 41S:

Runoff = 14.38 cfs @ 12.48 hrs, Volume= 2.051 af, Depth= 1.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,863 | 98 | Impervious |
| * | 44,367 | 96 | Gravel |
| | 50,657 | 58 | Meadow, non-grazed, HSG B |
| | 654,398 | 71 | Meadow, non-grazed, HSG C |
| | 153,128 | 78 | Meadow, non-grazed, HSG D |
| | 12,946 | 55 | Woods, Good, HSG B |
| | 30,598 | 70 | Woods, Good, HSG C |
| | 0 | 77 | Woods, Good, HSG D |
| | 33,461 | 61 | >75% Grass cover, Good, HSG B |
| | 6,740 | 74 | >75% Grass cover, Good, HSG C |
| | 1,003,158 | 72 | Weighted Average |
| | 986,295 | | 98.32% Pervious Area |
| | 16,863 | | 1.68% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 46.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 42S:

Runoff = 85.06 cfs @ 13.15 hrs, Volume= 19.709 af, Depth= 1.37"
Routed to Reach SP42 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 20,734 | 98 | Water Surface, HSG A |
| 170,414 | 96 | Gravel surface, HSG A |
| 956,587 | 71 | Meadow, non-grazed, HSG C |
| 5,227,848 | 78 | Meadow, non-grazed, HSG D |
| 287 | 65 | Brush, Good, HSG C |
| 56,930 | 73 | Brush, Good, HSG D |
| 32,944 | 70 | Woods, Good, HSG C |
| 1,046,689 | 77 | Woods, Good, HSG D |
| 7,512,433 | 77 | Weighted Average |
| 7,491,699 | | 99.72% Pervious Area |
| 20,734 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 96.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 43S:

Runoff = 49.77 cfs @ 12.50 hrs, Volume= 6.941 af, Depth= 1.37"
Routed to Reach SP43 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 2,810 | 98 | Impervious |
| | 440,724 | 71 | Meadow, non-grazed, HSG C |
| | 2,172,158 | 78 | Meadow, non-grazed, HSG D |
| | 11,726 | 70 | Woods, Good, HSG C |
| | 18,430 | 77 | Woods, Good, HSG D |
| | 2,645,848 | 77 | Weighted Average |
| | 2,643,038 | | 99.89% Pervious Area |
| | 2,810 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 48.7 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44S:

Runoff = 60.50 cfs @ 13.15 hrs, Volume= 14.091 af, Depth= 1.44"
Routed to Reach SP44 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 136,522 | 98 | Water |
| * | 27,820 | 98 | Impervious |
| * | 4,835 | 96 | Gravel |
| | 146,073 | 58 | Meadow, non-grazed, HSG B |
| | 90,051 | 71 | Meadow, non-grazed, HSG C |
| | 4,232,980 | 78 | Meadow, non-grazed, HSG D |
| | 82,986 | 73 | Brush, Good, HSG D |
| | 6,012 | 55 | Woods, Good, HSG B |
| | 3,850 | 70 | Woods, Good, HSG C |
| | 395,055 | 77 | Woods, Good, HSG D |
| | 5,126,184 | 78 | Weighted Average |
| | 4,961,842 | | 96.79% Pervious Area |
| | 164,342 | | 3.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 97.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44SA:

Runoff = 24.34 cfs @ 12.20 hrs, Volume= 2.159 af, Depth= 1.44"
Routed to Reach SP44A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,459 | 98 | Water |
| * | 21,218 | 98 | Impervious |
| * | 12,958 | 96 | Gravel |
| | 4,574 | 58 | Meadow, non-grazed, HSG B |
| | 57,514 | 71 | Meadow, non-grazed, HSG C |
| | 588,570 | 78 | Meadow, non-grazed, HSG D |
| | 988 | 48 | Brush, Good, HSG B |
| | 17,587 | 73 | Brush, Good, HSG D |
| | 2,222 | 55 | Woods, Good, HSG B |
| | 22,179 | 70 | Woods, Good, HSG C |
| | 49,212 | 77 | Woods, Good, HSG D |
| | 785,481 | 78 | Weighted Average |
| | 755,804 | | 96.22% Pervious Area |
| | 29,677 | | 3.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 25.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 45S:

Runoff = 18.30 cfs @ 12.24 hrs, Volume= 1.751 af, Depth= 1.57"
Routed to nonexistent node SP46

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 49,323 | 98 | Impervious |
| | 33,429 | 77 | Woods, Good, HSG D |
| | 12,134 | 73 | Brush, Good, HSG D |
| * | 720 | 96 | Gravel |
| | 478,790 | 78 | Meadow, non-grazed, HSG D |
| * | 7,562 | 98 | Water |
| | 581,958 | 80 | Weighted Average |
| | 525,073 | | 90.23% Pervious Area |
| | 56,885 | | 9.77% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 46S:

Runoff = 33.26 cfs @ 12.58 hrs, Volume= 5.085 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| Area (sf) | CN | Description |
|---|---|---|
| 367,923 | 77 | Woods, Good, HSG D |
| 229,882 | 55 | Woods, Good, HSG B |
| 1,508,838 | 78 | Meadow, non-grazed, HSG D |
| 27,326 | 73 | Brush, Good, HSG D |
| 2,133,969 | 75 | Weighted Average |
| 2,133,969 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 53.8 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 47S:

Runoff = 40.83 cfs @ 12.60 hrs, Volume= 6.304 af, Depth= 1.44"
Routed to Reach SP47 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Rainfall=3.42"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 23,846 | 98 | Impervious |
| * | 10,900 | 96 | Gravel |
| | 2,186,703 | 78 | Meadow, non-grazed, HSG D |
| | 15,310 | 73 | Brush, Good, HSG D |
| | 56,459 | 77 | Woods, Good, HSG D |
| | 2,293,218 | 78 | Weighted Average |
| | 2,269,372 | | 98.96% Pervious Area |
| | 23,846 | | 1.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 56.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,020,873 sf 2.29% Impervious Runoff Depth=1.07"
Flow Length=3,272' Tc=52.0 min CN=65 Runoff=37.81 cfs 6.180 af

**Subcatchment 3S:** Runoff Area=324,754 sf 0.00% Impervious Runoff Depth=1.01"
Flow Length=836' Tc=23.1 min CN=64 Runoff=6.72 cfs 0.629 af

**Subcatchment 4S:** Runoff Area=16,260,538 sf 1.60% Impervious Runoff Depth=1.38"
Flow Length=7,788' Tc=76.3 min CN=70 Runoff=211.69 cfs 42.822 af

**Subcatchment 5S:** Runoff Area=1,679,234 sf 4.90% Impervious Runoff Depth=1.58"
Flow Length=1,495' Tc=34.3 min CN=73 Runoff=46.35 cfs 5.069 af

**Subcatchment 6S:** Runoff Area=598,623 sf 0.00% Impervious Runoff Depth=1.51"
Flow Length=1,150' Tc=39.7 min CN=72 Runoff=14.15 cfs 1.729 af

**Subcatchment 7S:** Runoff Area=10,734,763 sf 0.11% Impervious Runoff Depth=1.38"
Flow Length=6,505' Tc=76.1 min CN=70 Runoff=140.36 cfs 28.270 af

**Subcatchment 8S:** Runoff Area=1,124,521 sf 2.07% Impervious Runoff Depth=1.44"
Flow Length=2,618' Tc=29.5 min CN=71 Runoff=30.95 cfs 3.103 af

**Subcatchment 9S:** Runoff Area=698,860 sf 9.80% Impervious Runoff Depth=1.79"
Flow Length=1,212' Tc=81.2 min CN=76 Runoff=11.91 cfs 2.396 af

**Subcatchment 10S:** Runoff Area=1,561,270 sf 0.00% Impervious Runoff Depth=1.79"
Flow Length=2,211' Tc=88.4 min CN=76 Runoff=25.04 cfs 5.353 af

**Subcatchment 11S:** Runoff Area=521,344 sf 3.42% Impervious Runoff Depth=2.02"
Flow Length=1,039' Tc=43.1 min CN=79 Runoff=16.24 cfs 2.015 af

**Subcatchment 12S:** Runoff Area=1,437,516 sf 0.62% Impervious Runoff Depth=1.94"
Flow Length=2,388' Tc=104.6 min CN=78 Runoff=22.09 cfs 5.343 af

**Subcatchment 13S:** Runoff Area=2,395,812 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=2,356' Tc=84.2 min CN=74 Runoff=36.15 cfs 7.553 af

**Subcatchment 14S:** Runoff Area=516,650 sf 1.75% Impervious Runoff Depth=1.79"
Flow Length=935' Tc=36.6 min CN=76 Runoff=15.76 cfs 1.772 af

**Subcatchment 15S:** Runoff Area=329,223 sf 1.24% Impervious Runoff Depth=1.13"
Flow Length=707' Tc=30.6 min CN=66 Runoff=6.48 cfs 0.710 af

**Subcatchment 16S:** Runoff Area=1,134,608 sf 1.12% Impervious Runoff Depth=1.94"
Flow Length=1,611' Tc=58.8 min CN=78 Runoff=27.01 cfs 4.217 af

**Subcatchment 16SA:** Runoff Area=657,258 sf 1.69% Impervious Runoff Depth=1.79"
Tc=39.9 min CN=76 Runoff=18.88 cfs 2.254 af

**Subcatchment 17S:** Runoff Area=6,847,928 sf 0.59% Impervious Runoff Depth=1.87"
Flow Length=4,736' Tc=94.5 min CN=77 Runoff=109.25 cfs 24.456 af

**Subcatchment 18S:** Runoff Area=4,001,602 sf 0.41% Impervious Runoff Depth=1.87"
Flow Length=3,889' Tc=66.4 min CN=77 Runoff=83.28 cfs 14.291 af

**Subcatchment 19S:** Runoff Area=5,028,770 sf 0.59% Impervious Runoff Depth=1.79"
Flow Length=4,703' Tc=80.9 min CN=76 Runoff=85.81 cfs 17.243 af

**Subcatchment 20S:** Runoff Area=2,479,797 sf 2.23% Impervious Runoff Depth=1.65"
Tc=71.1 min CN=74 Runoff=42.38 cfs 7.818 af

**Subcatchment 21S:** Runoff Area=332,609 sf 6.38% Impervious Runoff Depth=1.31"
Flow Length=921' Tc=31.9 min CN=69 Runoff=7.73 cfs 0.835 af

**Subcatchment 22S:** Runoff Area=785,644 sf 0.79% Impervious Runoff Depth=1.31"
Flow Length=1,439' Tc=53.3 min CN=69 Runoff=12.63 cfs 1.972 af

**Subcatchment 23S:** Runoff Area=17,302,399 sf 0.42% Impervious Runoff Depth=1.79"
Flow Length=9,131' Tc=88.7 min CN=76 Runoff=275.76 cfs 59.327 af

**Subcatchment 24S:** Runoff Area=260,905 sf 6.43% Impervious Runoff Depth=2.02"
Flow Length=1,200' Tc=31.2 min CN=79 Runoff=10.15 cfs 1.008 af

**Subcatchment 25S:** Runoff Area=10,643,407 sf 0.28% Impervious Runoff Depth=1.72"
Flow Length=7,278' Tc=71.0 min CN=75 Runoff=191.48 cfs 35.009 af

**Subcatchment 26S:** Runoff Area=823,994 sf 2.72% Impervious Runoff Depth=1.94"
Flow Length=1,347' Tc=43.1 min CN=78 Runoff=24.59 cfs 3.063 af

**Subcatchment 27S:** Runoff Area=1,317,635 sf 4.05% Impervious Runoff Depth=1.44"
Flow Length=3,107' Tc=46.4 min CN=71 Runoff=26.33 cfs 3.636 af

**Subcatchment 28S:** Runoff Area=2,868,130 sf 1.43% Impervious Runoff Depth=1.58"
Flow Length=2,822' Tc=32.9 min CN=73 Runoff=81.51 cfs 8.658 af

**Subcatchment 29S:** Runoff Area=776,122 sf 2.65% Impervious Runoff Depth=1.65"
Flow Length=1,737' Tc=24.4 min CN=74 Runoff=28.23 cfs 2.447 af

**Subcatchment 30S:** Runoff Area=618,450 sf 1.49% Impervious Runoff Depth=1.51"
Flow Length=1,427' Tc=38.4 min CN=72 Runoff=14.96 cfs 1.786 af

**Subcatchment 31S:** Runoff Area=2,981,588 sf 0.44% Impervious Runoff Depth=1.65"
Flow Length=1,885' Tc=60.7 min CN=74 Runoff=57.32 cfs 9.399 af

**Subcatchment 32S:** Runoff Area=4,274,758 sf 0.78% Impervious Runoff Depth=1.01"
Flow Length=3,031' Tc=75.2 min CN=64 Runoff=37.87 cfs 8.276 af

**Subcatchment 33S:** Runoff Area=4,477,391 sf 0.00% Impervious Runoff Depth=1.25"
Flow Length=2,390' Tc=58.6 min CN=68 Runoff=62.99 cfs 10.703 af

**Subcatchment 34S:** Runoff Area=1,658,827 sf 0.00% Impervious Runoff Depth=1.44"
Flow Length=1,443' Tc=42.0 min CN=71 Runoff=35.60 cfs 4.577 af

**Subcatchment 35S:** Runoff Area=2,634,778 sf 10.71% Impervious Runoff Depth=1.79"
Flow Length=3,089' Tc=26.1 min CN=76 Runoff=100.95 cfs 9.034 af

**Subcatchment 36S:** Runoff Area=6,697,461 sf 0.98% Impervious Runoff Depth=1.87"
Tc=38.4 min CN=77 Runoff=207.05 cfs 23.919 af

**Subcatchment 37S:** Runoff Area=3,957,824 sf 0.96% Impervious Runoff Depth=1.87"
Tc=39.6 min CN=77 Runoff=119.85 cfs 14.135 af

**Subcatchment 38S:** Runoff Area=734,553 sf 0.00% Impervious Runoff Depth=1.87"
Tc=38.1 min CN=77 Runoff=22.81 cfs 2.623 af

**Subcatchment 39S:** Runoff Area=2,495,408 sf 0.69% Impervious Runoff Depth=1.58"
Tc=54.4 min CN=73 Runoff=49.45 cfs 7.533 af

**Subcatchment 40S:** Runoff Area=2,878,096 sf 0.94% Impervious Runoff Depth=1.94"
Tc=47.3 min CN=78 Runoff=80.40 cfs 10.697 af

**Subcatchment 41S:** Runoff Area=1,003,158 sf 1.68% Impervious Runoff Depth=1.51"
Tc=46.5 min CN=72 Runoff=21.19 cfs 2.897 af

**Subcatchment 42S:** Runoff Area=7,512,433 sf 0.28% Impervious Runoff Depth=1.87"
Tc=96.3 min CN=77 Runoff=118.29 cfs 26.830 af

**Subcatchment 43S:** Runoff Area=2,645,848 sf 0.11% Impervious Runoff Depth=1.87"
Tc=48.7 min CN=77 Runoff=69.11 cfs 9.449 af

**Subcatchment 44S:** Runoff Area=5,126,184 sf 3.21% Impervious Runoff Depth=1.94"
Tc=97.1 min CN=78 Runoff=83.34 cfs 19.053 af

**Subcatchment 44SA:** Runoff Area=785,481 sf 3.78% Impervious Runoff Depth=1.94"
Tc=25.5 min CN=78 Runoff=33.33 cfs 2.919 af

**Subcatchment 45S:** Runoff Area=581,958 sf 9.77% Impervious Runoff Depth=2.10"
Tc=29.1 min CN=80 Runoff=24.65 cfs 2.338 af

**Subcatchment 46S:** Runoff Area=2,133,969 sf 0.00% Impervious Runoff Depth=1.72"
Tc=53.8 min CN=75 Runoff=47.12 cfs 7.019 af

**Subcatchment 47S:** Runoff Area=2,293,218 sf 1.04% Impervious Runoff Depth=1.94"
Tc=56.5 min CN=78 Runoff=56.18 cfs 8.523 af

**Total Runoff Area = 3,488.434 ac Runoff Volume = 480.887 af Average Runoff Depth = 1.65"**
**98.81% Pervious = 3,446.971 ac 1.19% Impervious = 41.462 ac**

## Summary for Subcatchment 1S:

Runoff = 37.81 cfs @ 12.57 hrs, Volume= 6.180 af, Depth= 1.07"
Routed to Reach SP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 94,531 | 77 | Woods, Good, HSG D |
| | 196,024 | 55 | Woods, Good, HSG B |
| | 9,804 | 48 | Brush, Good, HSG B |
| | 8,870 | 73 | Brush, Good, HSG D |
| * | 69,062 | 98 | Impervious Pavement |
| | 1,853,031 | 58 | Meadow, non-grazed, HSG B |
| | 789,551 | 78 | Meadow, non-grazed, HSG D |
| | 3,020,873 | 65 | Weighted Average |
| | 2,951,811 | | 97.71% Pervious Area |
| | 69,062 | | 2.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 15.8 | 784 | 0.0140 | 0.83 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 9.5 | 2,388 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 52.0 | 3,272 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 6.72 cfs @ 12.19 hrs, Volume= 0.629 af, Depth= 1.01"
Routed to Reach SP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 1,021 | 55 | Woods, Good, HSG B |
| 223,581 | 58 | Meadow, non-grazed, HSG B |
| 1,749 | 73 | Brush, Good, HSG D |
| 969 | 77 | Woods, Good, HSG D |
| 97,434 | 78 | Meadow, non-grazed, HSG D |
| 324,754 | 64 | Weighted Average |
| 324,754 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.6 | 241 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.1 | 445 | 0.0170 | 0.91 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 50 | 0.0300 | 0.87 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.1 | 836 | Total | | | |

## Summary for Subcatchment 4S:

[47] Hint: Peak is 2545% of capacity of segment #4
[47] Hint: Peak is 760% of capacity of segment #7
[47] Hint: Peak is 1521% of capacity of segment #9
[47] Hint: Peak is 657% of capacity of segment #11
[47] Hint: Peak is 7227% of capacity of segment #13
[47] Hint: Peak is 628% of capacity of segment #15

Runoff = 211.69 cfs @ 12.91 hrs, Volume= 42.822 af, Depth= 1.38"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 5,031 | 48 | Brush, Good, HSG B |
| * | 29,184 | 98 | Impervious Pavement |
| * | 9,824 | 98 | Impervious Roof |
| | 708,087 | 58 | Meadow, non-grazed, HSG B |
| | 34,201 | 55 | Woods, Good, HSG B |
| | 34,999 | 73 | Brush, Good, HSG D |
| | 320,256 | 77 | Woods, Good, HSG D |
| | 1,271 | 70 | Woods, Good, HSG C |
| | 170,830 | 71 | Meadow, non-grazed, HSG C |
| * | 2,590 | 96 | Gravel |
| * | 29,099 | 98 | Impervious Pavement |
| * | 287 | 98 | Impervious Roof |
| | 3,181,257 | 78 | Meadow, non-grazed, HSG D |
| | 9,634 | 48 | Brush, Good, HSG B |
| | 868,528 | 55 | Woods, Good, HSG B |
| * | 30,257 | 98 | Impervious Pavement |
| * | 10,455 | 98 | Impervious Roof |
| * | 4,215 | 96 | Gravel |
| | 2,040,672 | 58 | Meadow, non-grazed, HSG B |
| | 38,512 | 78 | Meadow, non-grazed, HSG D |
| | 55,419 | 77 | Woods, Good, HSG D |
| | 334,887 | 78 | Meadow, non-grazed, HSG D |
| | 26,398 | 73 | Brush, Good, HSG D |
| * | 20,636 | 98 | Impervious Pavement |
| | 885,711 | 77 | Woods, Good, HSG D |
| * | 4,759 | 96 | Gravel |
| | 2,163,012 | 78 | Meadow, non-grazed, HSG D |
| * | 10,062 | 98 | Impervious Roof |
| * | 13,878 | 98 | Impervious Pavement |
| * | 13,754 | 96 | Gravel |
| * | 15,803 | 98 | Water |
| | 777,230 | 55 | Woods, Good, HSG B |
| | 16,892 | 48 | Brush, Good, HSG B |
| | 1,287,972 | 58 | Meadow, non-grazed, HSG B |
| * | 72,761 | 98 | Impervious Pavement |
| * | 14,040 | 98 | Impervious Roof |
| * | 1,010 | 96 | Gravel |
| | 91,670 | 77 | Woods, Good, HSG D |
| | 16,841 | 73 | Brush, Good, HSG D |
| | 1,693,872 | 78 | Meadow, non-grazed, HSG D |
| | 55,622 | 55 | Woods, Good, HSG B |
| * | 4,369 | 98 | Impervious Pavement |
| | 643,096 | 58 | Meadow, non-grazed, HSG B |
| | 41,645 | 70 | Woods, Good, HSG C |
| | 470,010 | 71 | Meadow, non-grazed, HSG C |
| | 16,260,538 | 70 | Weighted Average |
| | 15,999,883 | | 98.40% Pervious Area |
| | 260,655 | | 1.60% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 277 | 0.0150 | 0.86 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 5.6 | 778 | 0.0240 | 2.32 | | **Shallow Concentrated Flow,**<br>Grassed Waterway Kv= 15.0 fps |
| 0.3 | 40 | 0.0050 | 2.65 | 8.32 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.1 | 741 | | 5.90 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.8 | 401 | | 3.76 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 0.0 | 18 | 0.0560 | 8.86 | 27.84 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.3 | 605 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 36 | 0.0140 | 4.43 | 13.92 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.3 | 627 | | 4.46 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 40 | 0.0750 | 10.25 | 32.22 | **Pipe Channel,**<br>24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50'<br>n= 0.025 Corrugated metal |
| 2.1 | 527 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.2 | 40 | 0.0250 | 3.73 | 2.93 | **Pipe Channel,**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.025 Corrugated metal |
| 4.0 | 593 | | 2.47 | | **Direct Entry, Roadside Ditch** |
| 0.1 | 40 | 0.0250 | 6.87 | 33.72 | **Pipe Channel,**<br>30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63'<br>n= 0.025 Corrugated metal |
| 23.2 | 2,925 | | 2.10 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.3 | 7,788 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 46.35 cfs @ 12.31 hrs, Volume= 5.069 af, Depth= 1.58"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,333 | 96 | Gravel |
| | 136,520 | 70 | Woods, Good, HSG C |
| * | 438 | 98 | Impervious Pavement |
| * | 6,831 | 98 | Impervious Roof |
| * | 7,136 | 98 | Water |
| | 915,909 | 71 | Meadow, non-grazed, HSG C |
| | 57,613 | 55 | Woods, Good, HSG B |
| * | 1,117 | 98 | Impervious Pavement |
| | 3,366 | 48 | Brush, Good, HSG B |
| * | 813 | 96 | Gravel |
| | 60,234 | 58 | Meadow, non-grazed, HSG B |
| * | 66,794 | 98 | Water |
| | 6,417 | 73 | Brush, Good, HSG D |
| * | 3,263 | 96 | Gravel |
| | 517 | 77 | Woods, Good, HSG D |
| | 199,842 | 78 | Meadow, non-grazed, HSG D |
| | 201,091 | 78 | Meadow, non-grazed, HSG D |
| | 1,679,234 | 73 | Weighted Average |
| | 1,596,918 | | 95.10% Pervious Area |
| | 82,316 | | 4.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 12.9 | 842 | 0.0240 | 1.08 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.2 | 311 | | 4.42 | | **Direct Entry, Grassed Waterway** |
| 0.6 | 242 | | 6.54 | | **Direct Entry, Grassed Waterway** |
| 34.3 | 1,495 | Total | | | |

## Summary for Subcatchment 6S:

Runoff = 14.15 cfs @ 12.39 hrs, Volume= 1.729 af, Depth= 1.51"
Routed to Reach SP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 23,122 | 70 | Woods, Good, HSG C |
| 31,419 | 65 | Brush, Good, HSG C |
| 437,478 | 71 | Meadow, non-grazed, HSG C |
| 11,524 | 73 | Brush, Good, HSG D |
| 2,524 | 77 | Woods, Good, HSG D |
| 55,990 | 78 | Meadow, non-grazed, HSG D |
| 1,516 | 70 | Woods, Good, HSG C |
| 2,812 | 77 | Woods, Good, HSG D |
| 20,186 | 78 | Meadow, non-grazed, HSG D |
| 12,052 | 71 | Meadow, non-grazed, HSG C |
| 598,623 | 72 | Weighted Average |
| 598,623 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 4.3 | 256 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.5 | 341 | 0.1030 | 2.25 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.4 | 316 | 0.1870 | 2.16 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 1.8 | 137 | | 1.26 | | **Direct Entry, Grassed Waterway** |
| 39.7 | 1,150 | Total | | | |

## Summary for Subcatchment 7S:

Runoff = 140.36 cfs @ 12.90 hrs, Volume= 28.270 af, Depth= 1.38"
Routed to Reach SP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,822,055 | 58 | Meadow, non-grazed, HSG B |
| | 23,489 | 48 | Brush, Good, HSG B |
| | 640,040 | 55 | Woods, Good, HSG B |
| | 2,269,487 | 71 | Meadow, non-grazed, HSG C |
| | 2,183 | 65 | Brush, Good, HSG C |
| | 137,505 | 70 | Woods, Good, HSG C |
| | 2,942,616 | 78 | Meadow, non-grazed, HSG D |
| | 53,119 | 73 | Brush, Good, HSG D |
| | 1,829,743 | 77 | Woods, Good, HSG D |
| * | 11,894 | 98 | Impervious |
| * | 2,632 | 96 | Gravel |
| | 10,734,763 | 70 | Weighted Average |
| | 10,722,869 | | 99.89% Pervious Area |
| | 11,894 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 449 | 0.0390 | 1.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.2 | 512 | 0.0220 | 1.04 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 20.3 | 945 | 0.0240 | 0.77 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 192 | 0.0310 | 0.88 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 14.9 | 3,312 | | 3.70 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.1 | 284 | 0.0530 | 1.15 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.8 | 711 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.1 | 6,505 | Total | | | |

## Summary for Subcatchment 8S:

Runoff = 30.95 cfs @ 12.26 hrs, Volume= 3.103 af, Depth= 1.44"
Routed to Reach SP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 0 | 55 | Woods, Good, HSG B |
| * | 1,030 | 98 | Impervious Pavement |
| | 27,402 | 58 | Meadow, non-grazed, HSG B |
| | 15,462 | 77 | Woods, Good, HSG D |
| * | 6,130 | 98 | Impervious Pavement |
| | 200,339 | 78 | Meadow, non-grazed, HSG D |
| | 25,785 | 55 | Woods, Good, HSG B |
| * | 1,580 | 96 | Gravel |
| * | 5,152 | 98 | Impervious Pavement |
| | 191,169 | 58 | Meadow, non-grazed, HSG B |
| * | 7,435 | 98 | Impervious Pavement |
| | 9,470 | 77 | Woods, Good, HSG D |
| | 423,047 | 78 | Meadow, non-grazed, HSG D |
| | 12,817 | 65 | Brush, Good, HSG C |
| * | 2,902 | 98 | Impervious Pavement |
| * | 3,771 | 96 | Gravel |
| * | 670 | 98 | Impervious Roof |
| | 190,360 | 58 | Meadow, non-grazed, HSG B |
| | 1,124,521 | 71 | Weighted Average |
| | 1,101,202 | | 97.93% Pervious Area |
| | 23,319 | | 2.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.2 | 100 | 0.0420 | 0.14 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.0 | 364 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 1,017 | | 2.68 | | **Direct Entry, Roadside Ditch** |
| 5.0 | 1,137 | | 3.82 | | **Direct Entry, Roadside Ditch** |
| 29.5 | 2,618 | Total | | | |

## Summary for Subcatchment 9S:

Runoff = 11.91 cfs @ 12.91 hrs, Volume= 2.396 af, Depth= 1.79"
Routed to Reach SP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 46,629 | 98 | Water |
| * | 6,554 | 98 | Impervious Pavement |
| | 424,080 | 78 | Meadow, non-grazed, HSG D |
| | 2,058 | 55 | Woods, Good, HSG B |
| | 7,321 | 48 | Brush, Good, HSG B |
| * | 10,739 | 98 | Water |
| * | 1,356 | 98 | Impervious Pavement |
| | 110,953 | 58 | Meadow, non-grazed, HSG B |
| * | 3,190 | 98 | Impervious Pavement |
| | 19,729 | 73 | Brush, Good, HSG D |
| | 66,251 | 78 | Meadow, non-grazed, HSG D |
| | 698,860 | 76 | Weighted Average |
| | 630,392 | | 90.20% Pervious Area |
| | 68,468 | | 9.80% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.0 | 540 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.6 | 572 | | 1.11 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 81.2 | 1,212 | Total | | | |

## Summary for Subcatchment 10S:

Runoff = 25.04 cfs @ 13.04 hrs, Volume= 5.353 af, Depth= 1.79"
Routed to Reach SP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 35,373 | 55 | Woods, Good, HSG B |
| 4,798 | 48 | Brush, Good, HSG B |
| 92,207 | 58 | Meadow, non-grazed, HSG B |
| 87,496 | 73 | Brush, Good, HSG D |
| 13,364 | 77 | Woods, Good, HSG D |
| 1,328,032 | 78 | Meadow, non-grazed, HSG D |
| 1,561,270 | 76 | Weighted Average |
| 1,561,270 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 16.9 | 388 | 0.0030 | 0.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 33 | 0.0610 | 1.23 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 165 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.2 | 310 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 8.2 | 920 | | 1.88 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.5 | 295 | | 3.39 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 88.4 | 2,211 | Total | | | |

## Summary for Subcatchment 11S:

Runoff = 16.24 cfs @ 12.41 hrs, Volume= 2.015 af, Depth= 2.02"
Routed to Reach SP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 17,843 | 98 | Paved parking, HSG D |
| 501,616 | 78 | Meadow, non-grazed, HSG D |
| 1,885 | 73 | Brush, Good, HSG D |
| 521,344 | 79 | Weighted Average |
| 503,501 | | 96.58% Pervious Area |
| 17,843 | | 3.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.2 | 100 | 0.0120 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 11.8 | 521 | 0.0110 | 0.73 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.1 | 418 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,039 | Total | | | |

## Summary for Subcatchment 12S:

Runoff = 22.09 cfs @ 13.24 hrs, Volume= 5.343 af, Depth= 1.94"
Routed to Reach SP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,897 | 98 | Impervious |
| | 8,690 | 58 | Meadow, non-grazed, HSG B |
| | 1,313,095 | 78 | Meadow, non-grazed, HSG D |
| | 5,821 | 73 | Brush, Good, HSG D |
| | 101,013 | 77 | Woods, Good, HSG D |
| | 1,437,516 | 78 | Weighted Average |
| | 1,428,619 | | 99.38% Pervious Area |
| | 8,897 | | 0.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 30.7 | 100 | 0.0470 | 0.05 | | **Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.40" |
| 25.9 | 601 | 0.0060 | 0.39 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 48.0 | 1,687 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 104.6 | 2,388 | Total | | | |

## Summary for Subcatchment 13S:

Runoff = 36.15 cfs @ 12.99 hrs, Volume= 7.553 af, Depth= 1.65"
Routed to Reach SP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 279,893 | 58 | Meadow, non-grazed, HSG B |
| 1,558,214 | 78 | Meadow, non-grazed, HSG D |
| 424 | 48 | Brush, Good, HSG B |
| 77,097 | 73 | Brush, Good, HSG D |
| 142,209 | 55 | Woods, Good, HSG B |
| 337,975 | 77 | Woods, Good, HSG D |
| 2,395,812 | 74 | Weighted Average |
| 2,395,812 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0230 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 48.9 | 1,838 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 418 | 0.0050 | 0.35 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 84.2 | 2,356 | Total | | | |

## Summary for Subcatchment 14S:

Runoff = 15.76 cfs @ 12.34 hrs, Volume= 1.772 af, Depth= 1.79"
Routed to Reach SP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,018 | 98 | Impervious |
| | 70,714 | 58 | Meadow, non-grazed, HSG B |
| | 428,883 | 78 | Meadow, non-grazed, HSG D |
| | 744 | 48 | Brush, Good, HSG B |
| | 189 | 73 | Brush, Good, HSG D |
| | 7,102 | 77 | Woods, Good, HSG D |
| | 516,650 | 76 | Weighted Average |
| | 507,632 | | 98.25% Pervious Area |
| | 9,018 | | 1.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.1 | 835 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.6 | 935 | Total | | | |

## Summary for Subcatchment 15S:

Runoff = 6.48 cfs @ 12.28 hrs, Volume= 0.710 af, Depth= 1.13"
Routed to Reach SP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 4,081 | 98 | Impervious |
| | 181,283 | 58 | Meadow, non-grazed, HSG B |
| | 126,101 | 78 | Meadow, non-grazed, HSG D |
| | 6,560 | 48 | Brush, Good, HSG B |
| | 2,092 | 73 | Brush, Good, HSG D |
| | 5,023 | 55 | Woods, Good, HSG B |
| | 4,083 | 77 | Woods, Good, HSG D |
| | 329,223 | 66 | Weighted Average |
| | 325,142 | | 98.76% Pervious Area |
| | 4,081 | | 1.24% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.9 | 100 | 0.0220 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 387 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.3 | 220 | 0.0040 | 0.44 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 30.6 | 707 | Total | | | |

## Summary for Subcatchment 16S:

Runoff = 27.01 cfs @ 12.62 hrs, Volume= 4.217 af, Depth= 1.94"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,714 | 98 | Impervious |
| | 25,066 | 71 | Meadow, non-grazed, HSG C |
| | 938,415 | 78 | Meadow, non-grazed, HSG D |
| | 3,358 | 73 | Brush, Good, HSG D |
| | 863 | 70 | Woods, Good, HSG C |
| | 154,192 | 77 | Woods, Good, HSG D |
| | 1,134,608 | 78 | Weighted Average |
| | 1,121,894 | | 98.88% Pervious Area |
| | 12,714 | | 1.12% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.0 | 100 | 0.0170 | 0.06 | | **Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.40" |
| 3.8 | 142 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 26.0 | 1,035 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.0 | 334 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.8 | 1,611 | Total | | | |

## Summary for Subcatchment 16SA:

Runoff = 18.88 cfs @ 12.38 hrs, Volume= 2.254 af, Depth= 1.79"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,093 | 98 | Impervious |
| | 70,093 | 58 | Meadow, non-grazed, HSG B |
| | 359,929 | 78 | Meadow, non-grazed, HSG D |
| | 259 | 48 | Brush, Good, HSG B |
| | 14,806 | 73 | Brush, Good, HSG D |
| | 0 | 70 | Woods, Good, HSG C |
| | 201,078 | 77 | Woods, Good, HSG D |
| | 657,258 | 76 | Weighted Average |
| | 646,165 | | 98.31% Pervious Area |
| | 11,093 | | 1.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.9 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 17S:

Runoff = 109.25 cfs @ 13.10 hrs, Volume= 24.456 af, Depth= 1.87"
Routed to Reach SP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 22,601 | 98 | Water Surface, HSG A |
| * | 17,632 | 98 | Impervious |
| | 252,955 | 71 | Meadow, non-grazed, HSG C |
| | 4,937,352 | 78 | Meadow, non-grazed, HSG D |
| | 16,810 | 65 | Brush, Good, HSG C |
| | 130,011 | 73 | Brush, Good, HSG D |
| | 111,819 | 70 | Woods, Good, HSG C |
| | 1,358,748 | 77 | Woods, Good, HSG D |
| | 6,847,928 | 77 | Weighted Average |
| | 6,807,695 | | 99.41% Pervious Area |
| | 40,233 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.1 | 50 | 0.0300 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 10.9 | 50 | 0.0140 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 32.6 | 2,373 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 33.8 | 1,418 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.1 | 845 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 94.5 | 4,736 | Total | | | |

## Summary for Subcatchment 18S:

Runoff = 83.28 cfs @ 12.73 hrs, Volume= 14.291 af, Depth= 1.87"
Routed to Reach SP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,953 | 98 | Water Surface, HSG A |
| * | 13,432 | 98 | Impervious |
| | 5,975 | 58 | Meadow, non-grazed, HSG B |
| | 29,944 | 71 | Meadow, non-grazed, HSG C |
| | 2,207,221 | 78 | Meadow, non-grazed, HSG D |
| | 157,865 | 73 | Brush, Good, HSG D |
| | 23,440 | 55 | Woods, Good, HSG B |
| | 321,869 | 70 | Woods, Good, HSG C |
| | 1,238,903 | 77 | Woods, Good, HSG D |
| | 4,001,602 | 77 | Weighted Average |
| | 3,985,217 | | 99.59% Pervious Area |
| | 16,385 | | 0.41% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.8 | 100 | 0.0150 | 0.06 | | **Sheet Flow,**<br>Woods: Light underbrush n= 0.400 P2= 2.40" |
| 6.8 | 205 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 23.6 | 2,144 | 0.0920 | 1.52 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 8.2 | 1,440 | | 2.92 | | **Direct Entry, Ditch** |
| 66.4 | 3,889 | Total | | | |

## Summary for Subcatchment 19S:

Runoff = 85.81 cfs @ 12.93 hrs, Volume= 17.243 af, Depth= 1.79"
Routed to Reach SP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,609 | 98 | Impervious |
| | 21,503 | 96 | Gravel surface, HSG A |
| | 84,734 | 58 | Meadow, non-grazed, HSG B |
| | 89,335 | 71 | Meadow, non-grazed, HSG C |
| | 2,422,408 | 78 | Meadow, non-grazed, HSG D |
| | 10,082 | 48 | Brush, Good, HSG B |
| | 74,495 | 73 | Brush, Good, HSG D |
| | 16,971 | 55 | Woods, Good, HSG B |
| | 681,805 | 70 | Woods, Good, HSG C |
| | 1,597,828 | 77 | Woods, Good, HSG D |
| | 5,028,770 | 76 | Weighted Average |
| | 4,999,161 | | 99.41% Pervious Area |
| | 29,609 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.7 | 100 | 0.0100 | 0.05 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 21.4 | 1,915 | 0.0890 | 1.49 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.3 | 706 | 0.0720 | 1.88 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.7 | 109 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.9 | 244 | 0.0410 | 1.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.2 | 706 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 6.7 | 923 | | 2.30 | | **Direct Entry, Small Tributary & Swamps w/ Channels** |
| 80.9 | 4,703 | Total | | | |

## Summary for Subcatchment 20S:

Runoff = 42.38 cfs @ 12.81 hrs, Volume= 7.818 af, Depth= 1.65"
Routed to Reach SP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 16,368 | 98 | Water Surface, HSG A |
| * | 38,886 | 98 | Impervious |
| | 503 | 96 | Gravel surface, HSG A |
| | 99,447 | 30 | Meadow, non-grazed, HSG A |
| | 58,596 | 58 | Meadow, non-grazed, HSG B |
| | 130,201 | 71 | Meadow, non-grazed, HSG C |
| | 1,680,681 | 78 | Meadow, non-grazed, HSG D |
| | 21,162 | 73 | Brush, Good, HSG D |
| | 131,716 | 55 | Woods, Good, HSG B |
| | 6,015 | 70 | Woods, Good, HSG C |
| | 296,222 | 77 | Woods, Good, HSG D |
| | 2,479,797 | 74 | Weighted Average |
| | 2,424,543 | | 97.77% Pervious Area |
| | 55,254 | | 2.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 71.1 | | | | | **Direct Entry, SEE SPREDSHEET** |

## Summary for Subcatchment 21S:

Runoff = 7.73 cfs @ 12.29 hrs, Volume= 0.835 af, Depth= 1.31"
Routed to Reach SP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 28,890 | 30 | Meadow, non-grazed, HSG A |
| 262,110 | 71 | Meadow, non-grazed, HSG C |
| 12,438 | 78 | Meadow, non-grazed, HSG D |
| 683 | 30 | Brush, Good, HSG A |
| 5,947 | 65 | Brush, Good, HSG C |
| 1,322 | 30 | Woods, Good, HSG A |
| 21,219 | 98 | Paved roads w/curbs & sewers, HSG A |
| 332,609 | 69 | Weighted Average |
| 311,390 | | 93.62% Pervious Area |
| 21,219 | | 6.38% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0410 | 0.13 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 19.5 | 821 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 31.9 | 921 | Total | | | |

## Summary for Subcatchment 22S:

Runoff = 12.63 cfs @ 12.58 hrs, Volume= 1.972 af, Depth= 1.31"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 87,197 | 30 | Meadow, non-grazed, HSG A |
| 418,867 | 71 | Meadow, non-grazed, HSG C |
| 134,602 | 78 | Meadow, non-grazed, HSG D |
| 814 | 65 | Brush, Good, HSG C |
| 7,253 | 73 | Brush, Good, HSG D |
| 843 | 30 | Woods, Good, HSG A |
| 3,389 | 70 | Woods, Good, HSG C |
| 126,479 | 77 | Woods, Good, HSG D |
| 6,200 | 98 | Paved roads w/curbs & sewers, HSG A |
| 785,644 | 69 | Weighted Average |
| 779,444 | | 99.21% Pervious Area |
| 6,200 | | 0.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 22.4 | 1,072 | 0.0130 | 0.80 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 83 | 0.1330 | 1.82 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 1.4 | 184 | | 2.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 53.3 | 1,439 | Total | | | |

## Summary for Subcatchment 23S:

Runoff = 275.76 cfs @ 13.05 hrs, Volume= 59.327 af, Depth= 1.79"
Routed to Reach SP23 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 33,228 | 30 | Meadow, non-grazed, HSG A |
| 494,460 | 71 | Meadow, non-grazed, HSG C |
| 7,349,351 | 78 | Meadow, non-grazed, HSG D |
| 299,742 | 65 | Brush, Good, HSG C |
| 1,788,044 | 73 | Brush, Good, HSG D |
| 1,493,479 | 70 | Woods, Good, HSG C |
| 5,745,558 | 77 | Woods, Good, HSG D |
| 73,510 | 98 | Paved roads w/curbs & sewers, HSG D |
| 25,027 | 96 | Gravel surface, HSG D |
| 17,302,399 | 76 | Weighted Average |
| 17,228,889 | | 99.58% Pervious Area |
| 73,510 | | 0.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.4 | 100 | 0.0420 | 0.09 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 22.2 | 1,941 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.2 | 806 | 0.0580 | 1.20 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.6 | 1,740 | | 2.49 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.2 | 1,229 | | 4.93 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 9.5 | 1,895 | | 3.32 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 3.8 | 650 | | 2.82 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 7.8 | 770 | | 1.64 | | **Direct Entry, Roadside Ditch** |
| 88.7 | 9,131 | Total | | | |

## Summary for Subcatchment 24S:

Runoff = 10.15 cfs @ 12.26 hrs, Volume= 1.008 af, Depth= 2.02"
Routed to Reach SP24 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 226,229 | 78 | Meadow, non-grazed, HSG D |
| 7,721 | 73 | Brush, Good, HSG D |
| 10,176 | 77 | Woods, Good, HSG D |
| 16,779 | 98 | Paved roads w/curbs & sewers, HSG D |
| 260,905 | 79 | Weighted Average |
| 244,126 | | 93.57% Pervious Area |
| 16,779 | | 6.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.1 | 100 | 0.0250 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 14.0 | 830 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.1 | 270 | | 2.17 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 31.2 | 1,200 | Total | | | |

## Summary for Subcatchment 25S:

Runoff = 191.48 cfs @ 12.80 hrs, Volume= 35.009 af, Depth= 1.72"
Routed to Reach SP25 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 816,850 | 58 | Meadow, non-grazed, HSG B |
| 955,101 | 71 | Meadow, non-grazed, HSG C |
| 5,104,595 | 78 | Meadow, non-grazed, HSG D |
| 18,372 | 48 | Brush, Good, HSG B |
| 265,288 | 73 | Brush, Good, HSG D |
| 189,511 | 55 | Woods, Good, HSG B |
| 3,244,843 | 77 | Woods, Good, HSG D |
| 29,278 | 98 | Paved roads w/curbs & sewers, HSG D |
| 19,569 | 96 | Gravel surface, HSG D |
| 10,643,407 | 75 | Weighted Average |
| 10,614,129 | | 99.72% Pervious Area |
| 29,278 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.9 | 1,281 | 0.0510 | 1.13 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.8 | 640 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 17.1 | 4,093 | | 3.98 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.6 | 482 | | 1.76 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.8 | 682 | | 2.39 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 71.0 | 7,278 | Total | | | |

## Summary for Subcatchment 26S:

Runoff = 24.59 cfs @ 12.41 hrs, Volume= 3.063 af, Depth= 1.94"
Routed to Reach SP26 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 75,400 | 77 | Woods, Good, HSG D |
| * | 4,254 | 98 | Water |
| | 50,954 | 71 | Meadow, non-grazed, HSG C |
| * | 18,174 | 98 | Impervious Pavement |
| | 675,212 | 78 | Meadow, non-grazed, HSG D |
| | 823,994 | 78 | Weighted Average |
| | 801,566 | | 97.28% Pervious Area |
| | 22,428 | | 2.72% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 527 | | 1.64 | | **Direct Entry, Ditch** |
| 19.2 | 720 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,347 | Total | | | |

## Summary for Subcatchment 27S:

Runoff = 26.33 cfs @ 12.48 hrs, Volume= 3.636 af, Depth= 1.44"
Routed to Reach SP27 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 102,395 | 30 | Meadow, non-grazed, HSG A |
| 70,249 | 58 | Meadow, non-grazed, HSG B |
| 356,229 | 71 | Meadow, non-grazed, HSG C |
| 594,316 | 78 | Meadow, non-grazed, HSG D |
| 15,001 | 48 | Brush, Good, HSG B |
| 136 | 65 | Brush, Good, HSG C |
| 35,121 | 73 | Brush, Good, HSG D |
| 1,761 | 30 | Woods, Good, HSG A |
| 10,015 | 55 | Woods, Good, HSG B |
| 44,190 | 70 | Woods, Good, HSG C |
| 27,054 | 77 | Woods, Good, HSG D |
| 53,425 | 98 | Paved roads w/curbs & sewers, HSG A |
| 7,743 | 96 | Gravel surface, HSG A |
| 1,317,635 | 71 | Weighted Average |
| 1,264,210 | | 95.95% Pervious Area |
| 53,425 | | 4.05% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 7.4 | 973 | 0.0970 | 2.18 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.4 | 548 | 0.0820 | 1.43 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.0 | 152 | 0.0330 | 1.27 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 12.9 | 824 | 0.0230 | 1.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 510 | | 1.34 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 46.4 | 3,107 | Total | | | |

## Summary for Subcatchment 28S:

Runoff = 81.51 cfs @ 12.29 hrs, Volume= 8.658 af, Depth= 1.58"
Routed to Reach SP28 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 148,045 | 58 | Meadow, non-grazed, HSG B |
| | 1,391,071 | 71 | Meadow, non-grazed, HSG C |
| | 1,142,501 | 78 | Meadow, non-grazed, HSG D |
| | 16,837 | 48 | Brush, Good, HSG B |
| | 158 | 65 | Brush, Good, HSG C |
| | 36,741 | 73 | Brush, Good, HSG D |
| | 39,665 | 55 | Woods, Good, HSG B |
| | 794 | 70 | Woods, Good, HSG C |
| | 51,395 | 77 | Woods, Good, HSG D |
| * | 40,923 | 98 | Impervious Surface |
| | 2,868,130 | 73 | Weighted Average |
| | 2,827,207 | | 98.57% Pervious Area |
| | 40,923 | | 1.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 2.3 | 163 | 0.0290 | 1.19 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 11.0 | 2,559 | | 3.88 | | **Direct Entry, Roadside Ditch** |
| 32.9 | 2,822 | Total | | | |

## Summary for Subcatchment 29S:

Runoff = 28.23 cfs @ 12.19 hrs, Volume= 2.447 af, Depth= 1.65"
Routed to Reach SP29 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,206 | 70 | Woods, Good, HSG C |
| * | 7,569 | 98 | Impervious Pavement |
| * | 4,117 | 98 | Impervious Roof |
| * | 5,127 | 96 | Gravel |
| | 247,913 | 71 | Meadow, non-grazed, HSG C |
| | 11,168 | 55 | Woods, Good, HSG B |
| | 740 | 65 | Brush, Good, HSG C |
| | 9,072 | 48 | Brush, Good, HSG B |
| * | 428 | 98 | Impervious Roof |
| | 56,539 | 58 | Meadow, non-grazed, HSG B |
| * | 8,416 | 98 | Impervious Pavement |
| | 16,068 | 77 | Woods, Good, HSG D |
| | 374,759 | 78 | Meadow, non-grazed, HSG D |
| | 776,122 | 74 | Weighted Average |
| | 755,592 | | 97.35% Pervious Area |
| | 20,530 | | 2.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.3 | 100 | 0.0650 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 0.5 | 63 | 0.0950 | 2.16 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 31 | 0.1290 | 1.80 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.1 | 612 | 0.0570 | 1.67 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.1 | 31 | 0.6100 | 3.91 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 7.1 | 900 | | 2.12 | | **Direct Entry, Roadside Ditch** |
| 24.4 | 1,737 | Total | | | |

## Summary for Subcatchment 30S:

Runoff = 14.96 cfs @ 12.37 hrs, Volume= 1.786 af, Depth= 1.51"
Routed to Reach SP30 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 511,468 | 71 | Meadow, non-grazed, HSG C |
| | 80,980 | 78 | Meadow, non-grazed, HSG D |
| | 16,758 | 70 | Woods, Good, HSG C |
| * | 9,244 | 98 | Impervious Surface |
| | 618,450 | 72 | Weighted Average |
| | 609,206 | | 98.51% Pervious Area |
| | 9,244 | | 1.49% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 10.4 | 1,152 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.3 | 175 | | 2.28 | | **Direct Entry, Roadside Ditch** |
| 38.4 | 1,427 | Total | | | |

## Summary for Subcatchment 31S:

Runoff = 57.32 cfs @ 12.66 hrs, Volume= 9.399 af, Depth= 1.65"
Routed to Reach SP31 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 66,905 | 58 | Meadow, non-grazed, HSG B |
| | 1,185,943 | 71 | Meadow, non-grazed, HSG C |
| | 1,398,406 | 78 | Meadow, non-grazed, HSG D |
| | 1,947 | 73 | Brush, Good, HSG D |
| | 84,560 | 55 | Woods, Good, HSG B |
| | 17,524 | 70 | Woods, Good, HSG C |
| | 213,262 | 77 | Woods, Good, HSG D |
| * | 13,041 | 98 | Impervious Surface |
| | 2,981,588 | 74 | Weighted Average |
| | 2,968,547 | | 99.56% Pervious Area |
| | 13,041 | | 0.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 35.2 | 100 | 0.0030 | 0.05 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.2 | 219 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.4 | 252 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.7 | 592 | 0.0440 | 1.47 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.2 | 722 | | 2.87 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 60.7 | 1,885 | Total | | | |

## Summary for Subcatchment 32S:

Runoff = 37.87 cfs @ 12.94 hrs, Volume= 8.276 af, Depth= 1.01"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,541,060 | 58 | Meadow, non-grazed, HSG B |
| | 716,554 | 71 | Meadow, non-grazed, HSG C |
| | 517,326 | 78 | Meadow, non-grazed, HSG D |
| | 869 | 48 | Brush, Good, HSG B |
| | 3,094 | 65 | Brush, Good, HSG C |
| | 4,465 | 73 | Brush, Good, HSG D |
| | 200,046 | 55 | Woods, Good, HSG B |
| | 46,472 | 70 | Woods, Good, HSG C |
| | 208,119 | 77 | Woods, Good, HSG D |
| * | 33,483 | 98 | Impervious Surface |
| | 3,270 | 96 | Gravel surface, HSG A |
| | 4,274,758 | 64 | Weighted Average |
| | 4,241,275 | | 99.22% Pervious Area |
| | 33,483 | | 0.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0200 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 848 | 0.1000 | 2.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 52.3 | 2,083 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 75.2 | 3,031 | Total | | | |

## Summary for Subcatchment 33S:

Runoff = 62.99 cfs @ 12.66 hrs, Volume= 10.703 af, Depth= 1.25"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 1,722,412 | 58 | Meadow, non-grazed, HSG B |
| 1,542,409 | 78 | Meadow, non-grazed, HSG D |
| 1,381 | 73 | Brush, Good, HSG D |
| 384,753 | 55 | Woods, Good, HSG B |
| 826,436 | 77 | Woods, Good, HSG D |
| 4,477,391 | 68 | Weighted Average |
| 4,477,391 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.1 | 100 | 0.0340 | 0.08 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 24.6 | 932 | 0.0160 | 0.63 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.8 | 1,157 | 0.0460 | 1.50 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 60 | 0.3120 | 2.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 0.7 | 141 | | 3.19 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.6 | 2,390 | Total | | | |

## Summary for Subcatchment 34S:

Runoff = 35.60 cfs @ 12.42 hrs, Volume= 4.577 af, Depth= 1.44"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 20,254 | 58 | Meadow, non-grazed, HSG B |
| 937,330 | 78 | Meadow, non-grazed, HSG D |
| 16,371 | 48 | Brush, Good, HSG B |
| 35,437 | 73 | Brush, Good, HSG D |
| 429,230 | 55 | Woods, Good, HSG B |
| 220,205 | 77 | Woods, Good, HSG D |
| 1,658,827 | 71 | Weighted Average |
| 1,658,827 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.5 | 100 | 0.0320 | 0.08 | | **Sheet Flow,**<br>Woods: Light underbrush n= 0.400 P2= 2.40" |
| 2.9 | 130 | 0.0220 | 0.74 | | **Shallow Concentrated Flow,**<br>Woodland Kv= 5.0 fps |
| 18.3 | 1,058 | 0.0190 | 0.96 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 155 | | 8.93 | | **Direct Entry, Small tributary & Swamp w/channels** |
| 42.0 | 1,443 | Total | | | |

## Summary for Subcatchment 35S:

Runoff = 100.95 cfs @ 12.21 hrs, Volume= 9.034 af, Depth= 1.79"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 32,311 | 58 | Meadow, non-grazed, HSG B |
| 36,347 | 71 | Meadow, non-grazed, HSG C |
| 1,445,641 | 78 | Meadow, non-grazed, HSG D |
| 26,860 | 73 | Brush, Good, HSG D |
| 450,341 | 55 | Woods, Good, HSG B |
| 79,608 | 70 | Woods, Good, HSG C |
| 204,736 | 77 | Woods, Good, HSG D |
| 282,102 | 98 | Paved roads w/curbs & sewers, HSG D |
| 76,832 | 96 | Gravel surface, HSG D |
| 2,634,778 | 76 | Weighted Average |
| 2,352,676 | | 89.29% Pervious Area |
| 282,102 | | 10.71% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.4 | 100 | 0.0050 | 0.68 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40" |
| 2.6 | 755 | 0.0590 | 4.93 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 2.5 | 438 | | 2.91 | | **Direct Entry,** |
| 17.6 | 1,445 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 351 | | 5.94 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 26.1 | 3,089 | Total | | | |

## Summary for Subcatchment 36S:

Runoff = 207.05 cfs @ 12.36 hrs, Volume= 23.919 af, Depth= 1.87"
Routed to Reach SP36 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 52,184 | 58 | Meadow, non-grazed, HSG B |
| 695 | 71 | Meadow, non-grazed, HSG C |
| 5,121,405 | 78 | Meadow, non-grazed, HSG D |
| 1,145 | 48 | Brush, Good, HSG B |
| 33,870 | 73 | Brush, Good, HSG D |
| 278,876 | 55 | Woods, Good, HSG B |
| 346,117 | 70 | Woods, Good, HSG C |
| 782,902 | 77 | Woods, Good, HSG D |
| 65,616 | 98 | Paved roads w/curbs & sewers, HSG D |
| 14,651 | 96 | Gravel surface, HSG D |
| 6,697,461 | 77 | Weighted Average |
| 6,631,845 | | 99.02% Pervious Area |
| 65,616 | | 0.98% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.4 | | | | | **Direct Entry, SEE SPREADHSEET** |

## Summary for Subcatchment 37S:

Runoff = 119.85 cfs @ 12.37 hrs, Volume= 14.135 af, Depth= 1.87"
Routed to Reach SP37 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 30,667 | 98 | Impervious |
| | 13,321 | 96 | Gravel surface, HSG A |
| * | 7,485 | 98 | Water |
| | 57,778 | 58 | Meadow, non-grazed, HSG B |
| | 3,215,975 | 78 | Meadow, non-grazed, HSG D |
| | 805 | 48 | Brush, Good, HSG B |
| | 915 | 73 | Brush, Good, HSG D |
| | 76,106 | 55 | Woods, Good, HSG B |
| | 148,513 | 70 | Woods, Good, HSG C |
| | 406,259 | 77 | Woods, Good, HSG D |
| | 3,957,824 | 77 | Weighted Average |
| | 3,919,672 | | 99.04% Pervious Area |
| | 38,152 | | 0.96% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.6 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 38S:

Runoff = 22.81 cfs @ 12.35 hrs, Volume= 2.623 af, Depth= 1.87"
Routed to Reach SP38 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 355,232 | 78 | Meadow, non-grazed, HSG D |
| 379,321 | 77 | Woods, Good, HSG D |
| 734,553 | 77 | Weighted Average |
| 734,553 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 39S:

Runoff = 49.45 cfs @ 12.58 hrs, Volume= 7.533 af, Depth= 1.58"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 113,238 | 30 | Woods, Good, HSG A |
| * | 17,184 | 98 | Impervious Pavement |
| | 149,774 | 30 | Meadow, non-grazed, HSG A |
| | 11,690 | 30 | Brush, Good, HSG A |
| | 30,170 | 70 | Woods, Good, HSG C |
| | 7,231 | 71 | Meadow, non-grazed, HSG C |
| | 194,104 | 77 | Woods, Good, HSG D |
| | 70,193 | 73 | Brush, Good, HSG D |
| * | 2,287 | 96 | Gravel |
| | 1,899,537 | 78 | Meadow, non-grazed, HSG D |
| | 2,495,408 | 73 | Weighted Average |
| | 2,478,224 | | 99.31% Pervious Area |
| | 17,184 | | 0.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.4 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 40S:

Runoff = 80.40 cfs @ 12.47 hrs, Volume= 10.697 af, Depth= 1.94"
Routed to Reach SP40 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,987 | 98 | Impervious Pavement |
| | 171,417 | 77 | Woods, Good, HSG D |
| | 20,992 | 73 | Brush, Good, HSG D |
| | 2,658,700 | 78 | Meadow, non-grazed, HSG D |
| | 2,878,096 | 78 | Weighted Average |
| | 2,851,109 | | 99.06% Pervious Area |
| | 26,987 | | 0.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 41S:

Runoff = 21.19 cfs @ 12.47 hrs, Volume= 2.897 af, Depth= 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,863 | 98 | Impervious |
| * | 44,367 | 96 | Gravel |
| | 50,657 | 58 | Meadow, non-grazed, HSG B |
| | 654,398 | 71 | Meadow, non-grazed, HSG C |
| | 153,128 | 78 | Meadow, non-grazed, HSG D |
| | 12,946 | 55 | Woods, Good, HSG B |
| | 30,598 | 70 | Woods, Good, HSG C |
| | 0 | 77 | Woods, Good, HSG D |
| | 33,461 | 61 | >75% Grass cover, Good, HSG B |
| | 6,740 | 74 | >75% Grass cover, Good, HSG C |
| | 1,003,158 | 72 | Weighted Average |
| | 986,295 | | 98.32% Pervious Area |
| | 16,863 | | 1.68% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 46.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 42S:

Runoff = 118.29 cfs @ 13.14 hrs, Volume= 26.830 af, Depth= 1.87"
Routed to Reach SP42 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 20,734 | 98 | Water Surface, HSG A |
| 170,414 | 96 | Gravel surface, HSG A |
| 956,587 | 71 | Meadow, non-grazed, HSG C |
| 5,227,848 | 78 | Meadow, non-grazed, HSG D |
| 287 | 65 | Brush, Good, HSG C |
| 56,930 | 73 | Brush, Good, HSG D |
| 32,944 | 70 | Woods, Good, HSG C |
| 1,046,689 | 77 | Woods, Good, HSG D |
| 7,512,433 | 77 | Weighted Average |
| 7,491,699 | | 99.72% Pervious Area |
| 20,734 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 96.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 43S:

Runoff = 69.11 cfs @ 12.49 hrs, Volume= 9.449 af, Depth= 1.87"
Routed to Reach SP43 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 2,810 | 98 | Impervious |
| | 440,724 | 71 | Meadow, non-grazed, HSG C |
| | 2,172,158 | 78 | Meadow, non-grazed, HSG D |
| | 11,726 | 70 | Woods, Good, HSG C |
| | 18,430 | 77 | Woods, Good, HSG D |
| | 2,645,848 | 77 | Weighted Average |
| | 2,643,038 | | 99.89% Pervious Area |
| | 2,810 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 48.7 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44S:

Runoff = 83.34 cfs @ 13.13 hrs, Volume= 19.053 af, Depth= 1.94"
Routed to Reach SP44 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 136,522 | 98 | Water |
| * | 27,820 | 98 | Impervious |
| * | 4,835 | 96 | Gravel |
| | 146,073 | 58 | Meadow, non-grazed, HSG B |
| | 90,051 | 71 | Meadow, non-grazed, HSG C |
| | 4,232,980 | 78 | Meadow, non-grazed, HSG D |
| | 82,986 | 73 | Brush, Good, HSG D |
| | 6,012 | 55 | Woods, Good, HSG B |
| | 3,850 | 70 | Woods, Good, HSG C |
| | 395,055 | 77 | Woods, Good, HSG D |
| | 5,126,184 | 78 | Weighted Average |
| | 4,961,842 | | 96.79% Pervious Area |
| | 164,342 | | 3.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 97.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44SA:

Runoff = 33.33 cfs @ 12.20 hrs, Volume= 2.919 af, Depth= 1.94"
Routed to Reach SP44A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,459 | 98 | Water |
| * | 21,218 | 98 | Impervious |
| * | 12,958 | 96 | Gravel |
| | 4,574 | 58 | Meadow, non-grazed, HSG B |
| | 57,514 | 71 | Meadow, non-grazed, HSG C |
| | 588,570 | 78 | Meadow, non-grazed, HSG D |
| | 988 | 48 | Brush, Good, HSG B |
| | 17,587 | 73 | Brush, Good, HSG D |
| | 2,222 | 55 | Woods, Good, HSG B |
| | 22,179 | 70 | Woods, Good, HSG C |
| | 49,212 | 77 | Woods, Good, HSG D |
| | 785,481 | 78 | Weighted Average |
| | 755,804 | | 96.22% Pervious Area |
| | 29,677 | | 3.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 25.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 45S:

Runoff = 24.65 cfs @ 12.24 hrs, Volume= 2.338 af, Depth= 2.10"
Routed to nonexistent node SP46

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 49,323 | 98 | Impervious |
| | 33,429 | 77 | Woods, Good, HSG D |
| | 12,134 | 73 | Brush, Good, HSG D |
| * | 720 | 96 | Gravel |
| | 478,790 | 78 | Meadow, non-grazed, HSG D |
| * | 7,562 | 98 | Water |
| | 581,958 | 80 | Weighted Average |
| | 525,073 | | 90.23% Pervious Area |
| | 56,885 | | 9.77% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 46S:

Runoff = 47.12 cfs @ 12.57 hrs, Volume= 7.019 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| Area (sf) | CN | Description |
|---|---|---|
| 367,923 | 77 | Woods, Good, HSG D |
| 229,882 | 55 | Woods, Good, HSG B |
| 1,508,838 | 78 | Meadow, non-grazed, HSG D |
| 27,326 | 73 | Brush, Good, HSG D |
| 2,133,969 | 75 | Weighted Average |
| 2,133,969 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 53.8 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 47S:

Runoff = 56.18 cfs @ 12.59 hrs, Volume= 8.523 af, Depth= 1.94"
Routed to Reach SP47 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Rainfall=4.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 23,846 | 98 | Impervious |
| * | 10,900 | 96 | Gravel |
| | 2,186,703 | 78 | Meadow, non-grazed, HSG D |
| | 15,310 | 73 | Brush, Good, HSG D |
| | 56,459 | 77 | Woods, Good, HSG D |
| | 2,293,218 | 78 | Weighted Average |
| | 2,269,372 | | 98.96% Pervious Area |
| | 23,846 | | 1.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 56.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment 1S:** Runoff Area=3,020,873 sf 2.29% Impervious Runoff Depth=1.70"
Flow Length=3,272' Tc=52.0 min CN=65 Runoff=64.68 cfs 9.826 af

**Subcatchment 3S:** Runoff Area=324,754 sf 0.00% Impervious Runoff Depth=1.63"
Flow Length=836' Tc=23.1 min CN=64 Runoff=11.58 cfs 1.010 af

**Subcatchment 4S:** Runoff Area=16,260,538 sf 1.60% Impervious Runoff Depth=2.09"
Flow Length=7,788' Tc=76.3 min CN=70 Runoff=334.30 cfs 64.964 af

**Subcatchment 5S:** Runoff Area=1,679,234 sf 4.90% Impervious Runoff Depth=2.34"
Flow Length=1,495' Tc=34.3 min CN=73 Runoff=70.28 cfs 7.503 af

**Subcatchment 6S:** Runoff Area=598,623 sf 0.00% Impervious Runoff Depth=2.25"
Flow Length=1,150' Tc=39.7 min CN=72 Runoff=21.72 cfs 2.579 af

**Subcatchment 7S:** Runoff Area=10,734,763 sf 0.11% Impervious Runoff Depth=2.09"
Flow Length=6,505' Tc=76.1 min CN=70 Runoff=221.62 cfs 42.888 af

**Subcatchment 8S:** Runoff Area=1,124,521 sf 2.07% Impervious Runoff Depth=2.17"
Flow Length=2,618' Tc=29.5 min CN=71 Runoff=47.97 cfs 4.667 af

**Subcatchment 9S:** Runoff Area=698,860 sf 9.80% Impervious Runoff Depth=2.59"
Flow Length=1,212' Tc=81.2 min CN=76 Runoff=17.57 cfs 3.467 af

**Subcatchment 10S:** Runoff Area=1,561,270 sf 0.00% Impervious Runoff Depth=2.59"
Flow Length=2,211' Tc=88.4 min CN=76 Runoff=36.88 cfs 7.746 af

**Subcatchment 11S:** Runoff Area=521,344 sf 3.42% Impervious Runoff Depth=2.86"
Flow Length=1,039' Tc=43.1 min CN=79 Runoff=23.21 cfs 2.854 af

**Subcatchment 12S:** Runoff Area=1,437,516 sf 0.62% Impervious Runoff Depth=2.77"
Flow Length=2,388' Tc=104.6 min CN=78 Runoff=31.94 cfs 7.621 af

**Subcatchment 13S:** Runoff Area=2,395,812 sf 0.00% Impervious Runoff Depth=2.42"
Flow Length=2,356' Tc=84.2 min CN=74 Runoff=54.39 cfs 11.093 af

**Subcatchment 14S:** Runoff Area=516,650 sf 1.75% Impervious Runoff Depth=2.59"
Flow Length=935' Tc=36.6 min CN=76 Runoff=23.15 cfs 2.563 af

**Subcatchment 15S:** Runoff Area=329,223 sf 1.24% Impervious Runoff Depth=1.78"
Flow Length=707' Tc=30.6 min CN=66 Runoff=10.85 cfs 1.118 af

**Subcatchment 16S:** Runoff Area=1,134,608 sf 1.12% Impervious Runoff Depth=2.77"
Flow Length=1,611' Tc=58.8 min CN=78 Runoff=39.01 cfs 6.015 af

**Subcatchment 16SA:** Runoff Area=657,258 sf 1.69% Impervious Runoff Depth=2.59"
Tc=39.9 min CN=76 Runoff=27.80 cfs 3.261 af

**Subcatchment 17S:** Runoff Area=6,847,928 sf 0.59% Impervious Runoff Depth=2.68"
Flow Length=4,736' Tc=94.5 min CN=77 Runoff=159.48 cfs 35.131 af

**Subcatchment 18S:** Runoff Area=4,001,602 sf 0.41% Impervious Runoff Depth=2.68"
Flow Length=3,889' Tc=66.4 min CN=77 Runoff=121.31 cfs 20.529 af

**Subcatchment 19S:** Runoff Area=5,028,770 sf 0.59% Impervious Runoff Depth=2.59"
Flow Length=4,703' Tc=80.9 min CN=76 Runoff=126.47 cfs 24.949 af

**Subcatchment 20S:** Runoff Area=2,479,797 sf 2.23% Impervious Runoff Depth=2.42"
Tc=71.1 min CN=74 Runoff=63.77 cfs 11.482 af

**Subcatchment 21S:** Runoff Area=332,609 sf 6.38% Impervious Runoff Depth=2.01"
Flow Length=921' Tc=31.9 min CN=69 Runoff=12.32 cfs 1.278 af

**Subcatchment 22S:** Runoff Area=785,644 sf 0.79% Impervious Runoff Depth=2.01"
Flow Length=1,439' Tc=53.3 min CN=69 Runoff=20.19 cfs 3.019 af

**Subcatchment 23S:** Runoff Area=17,302,399 sf 0.42% Impervious Runoff Depth=2.59"
Flow Length=9,131' Tc=88.7 min CN=76 Runoff=406.51 cfs 85.840 af

**Subcatchment 24S:** Runoff Area=260,905 sf 6.43% Impervious Runoff Depth=2.86"
Flow Length=1,200' Tc=31.2 min CN=79 Runoff=14.48 cfs 1.429 af

**Subcatchment 25S:** Runoff Area=10,643,407 sf 0.28% Impervious Runoff Depth=2.51"
Flow Length=7,278' Tc=71.0 min CN=75 Runoff=284.98 cfs 51.029 af

**Subcatchment 26S:** Runoff Area=823,994 sf 2.72% Impervious Runoff Depth=2.77"
Flow Length=1,347' Tc=43.1 min CN=78 Runoff=35.47 cfs 4.368 af

**Subcatchment 27S:** Runoff Area=1,317,635 sf 4.05% Impervious Runoff Depth=2.17"
Flow Length=3,107' Tc=46.4 min CN=71 Runoff=41.02 cfs 5.469 af

**Subcatchment 28S:** Runoff Area=2,868,130 sf 1.43% Impervious Runoff Depth=2.34"
Flow Length=2,822' Tc=32.9 min CN=73 Runoff=123.53 cfs 12.815 af

**Subcatchment 29S:** Runoff Area=776,122 sf 2.65% Impervious Runoff Depth=2.42"
Flow Length=1,737' Tc=24.4 min CN=74 Runoff=42.16 cfs 3.593 af

**Subcatchment 30S:** Runoff Area=618,450 sf 1.49% Impervious Runoff Depth=2.25"
Flow Length=1,427' Tc=38.4 min CN=72 Runoff=22.97 cfs 2.664 af

**Subcatchment 31S:** Runoff Area=2,981,588 sf 0.44% Impervious Runoff Depth=2.42"
Flow Length=1,885' Tc=60.7 min CN=74 Runoff=86.25 cfs 13.805 af

**Subcatchment 32S:** Runoff Area=4,274,758 sf 0.78% Impervious Runoff Depth=1.63"
Flow Length=3,031' Tc=75.2 min CN=64 Runoff=65.60 cfs 13.299 af

**Subcatchment 33S:** Runoff Area=4,477,391 sf 0.00% Impervious Runoff Depth=1.93"
Flow Length=2,390' Tc=58.6 min CN=68 Runoff=102.33 cfs 16.528 af

**Subcatchment 34S:** Runoff Area=1,658,827 sf 0.00% Impervious Runoff Depth=2.17"
Flow Length=1,443' Tc=42.0 min CN=71 Runoff=55.38 cfs 6.885 af

**Subcatchment 35S:** Runoff Area=2,634,778 sf 10.71% Impervious Runoff Depth=2.59"
Flow Length=3,089' Tc=26.1 min CN=76 Runoff=147.83 cfs 13.072 af

**Subcatchment 36S:** Runoff Area=6,697,461 sf 0.98% Impervious Runoff Depth=2.68"
Tc=38.4 min CN=77 Runoff=301.27 cfs 34.359 af

**Subcatchment 37S:** Runoff Area=3,957,824 sf 0.96% Impervious Runoff Depth=2.68"
Tc=39.6 min CN=77 Runoff=174.46 cfs 20.304 af

**Subcatchment 38S:** Runoff Area=734,553 sf 0.00% Impervious Runoff Depth=2.68"
Tc=38.1 min CN=77 Runoff=33.18 cfs 3.768 af

**Subcatchment 39S:** Runoff Area=2,495,408 sf 0.69% Impervious Runoff Depth=2.34"
Tc=54.4 min CN=73 Runoff=75.20 cfs 11.149 af

**Subcatchment 40S:** Runoff Area=2,878,096 sf 0.94% Impervious Runoff Depth=2.77"
Tc=47.3 min CN=78 Runoff=116.03 cfs 15.258 af

**Subcatchment 41S:** Runoff Area=1,003,158 sf 1.68% Impervious Runoff Depth=2.25"
Tc=46.5 min CN=72 Runoff=32.59 cfs 4.322 af

**Subcatchment 42S:** Runoff Area=7,512,433 sf 0.28% Impervious Runoff Depth=2.68"
Tc=96.3 min CN=77 Runoff=172.59 cfs 38.540 af

**Subcatchment 43S:** Runoff Area=2,645,848 sf 0.11% Impervious Runoff Depth=2.68"
Tc=48.7 min CN=77 Runoff=100.68 cfs 13.574 af

**Subcatchment 44S:** Runoff Area=5,126,184 sf 3.21% Impervious Runoff Depth=2.77"
Tc=97.1 min CN=78 Runoff=120.52 cfs 27.177 af

**Subcatchment 44SA:** Runoff Area=785,481 sf 3.78% Impervious Runoff Depth=2.77"
Tc=25.5 min CN=78 Runoff=47.87 cfs 4.164 af

**Subcatchment 45S:** Runoff Area=581,958 sf 9.77% Impervious Runoff Depth=2.95"
Tc=29.1 min CN=80 Runoff=34.82 cfs 3.289 af

**Subcatchment 46S:** Runoff Area=2,133,969 sf 0.00% Impervious Runoff Depth=2.51"
Tc=53.8 min CN=75 Runoff=70.08 cfs 10.231 af

**Subcatchment 47S:** Runoff Area=2,293,218 sf 1.04% Impervious Runoff Depth=2.77"
Tc=56.5 min CN=78 Runoff=81.11 cfs 12.158 af

**Total Runoff Area = 3,488.434 ac Runoff Volume = 704.653 af Average Runoff Depth = 2.42"**
**98.81% Pervious = 3,446.971 ac 1.19% Impervious = 41.462 ac**

## Summary for Subcatchment 1S:

Runoff = 64.68 cfs @ 12.56 hrs, Volume= 9.826 af, Depth= 1.70"
Routed to Reach SP1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 94,531 | 77 | Woods, Good, HSG D |
| | 196,024 | 55 | Woods, Good, HSG B |
| | 9,804 | 48 | Brush, Good, HSG B |
| | 8,870 | 73 | Brush, Good, HSG D |
| * | 69,062 | 98 | Impervious Pavement |
| | 1,853,031 | 58 | Meadow, non-grazed, HSG B |
| | 789,551 | 78 | Meadow, non-grazed, HSG D |
| | 3,020,873 | 65 | Weighted Average |
| | 2,951,811 | | 97.71% Pervious Area |
| | 69,062 | | 2.29% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** |
| | | | | | Grass: Dense n= 0.240 P2= 2.40" |
| 15.8 | 784 | 0.0140 | 0.83 | | **Shallow Concentrated Flow,** |
| | | | | | Short Grass Pasture Kv= 7.0 fps |
| 9.5 | 2,388 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 52.0 | 3,272 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 11.58 cfs @ 12.18 hrs, Volume= 1.010 af, Depth= 1.63"
Routed to Reach SP3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 1,021 | 55 | Woods, Good, HSG B |
| 223,581 | 58 | Meadow, non-grazed, HSG B |
| 1,749 | 73 | Brush, Good, HSG D |
| 969 | 77 | Woods, Good, HSG D |
| 97,434 | 78 | Meadow, non-grazed, HSG D |
| 324,754 | 64 | Weighted Average |
| 324,754 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.6 | 241 | 0.0500 | 1.57 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.1 | 445 | 0.0170 | 0.91 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 50 | 0.0300 | 0.87 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.1 | 836 | Total | | | |

## Summary for Subcatchment 4S:

[47] Hint: Peak is 4019% of capacity of segment #4
[47] Hint: Peak is 1201% of capacity of segment #7
[47] Hint: Peak is 2402% of capacity of segment #9
[47] Hint: Peak is 1038% of capacity of segment #11
[47] Hint: Peak is 11412% of capacity of segment #13
[47] Hint: Peak is 991% of capacity of segment #15

Runoff = 334.30 cfs @ 12.87 hrs, Volume= 64.964 af, Depth= 2.09"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 5,031 | 48 | Brush, Good, HSG B |
| * | 29,184 | 98 | Impervious Pavement |
| * | 9,824 | 98 | Impervious Roof |
| | 708,087 | 58 | Meadow, non-grazed, HSG B |
| | 34,201 | 55 | Woods, Good, HSG B |
| | 34,999 | 73 | Brush, Good, HSG D |
| | 320,256 | 77 | Woods, Good, HSG D |
| | 1,271 | 70 | Woods, Good, HSG C |
| | 170,830 | 71 | Meadow, non-grazed, HSG C |
| * | 2,590 | 96 | Gravel |
| * | 29,099 | 98 | Impervious Pavement |
| * | 287 | 98 | Impervious Roof |
| | 3,181,257 | 78 | Meadow, non-grazed, HSG D |
| | 9,634 | 48 | Brush, Good, HSG B |
| | 868,528 | 55 | Woods, Good, HSG B |
| * | 30,257 | 98 | Impervious Pavement |
| * | 10,455 | 98 | Impervious Roof |
| * | 4,215 | 96 | Gravel |
| | 2,040,672 | 58 | Meadow, non-grazed, HSG B |
| | 38,512 | 78 | Meadow, non-grazed, HSG D |
| | 55,419 | 77 | Woods, Good, HSG D |
| | 334,887 | 78 | Meadow, non-grazed, HSG D |
| | 26,398 | 73 | Brush, Good, HSG D |
| * | 20,636 | 98 | Impervious Pavement |
| | 885,711 | 77 | Woods, Good, HSG D |
| * | 4,759 | 96 | Gravel |
| | 2,163,012 | 78 | Meadow, non-grazed, HSG D |
| * | 10,062 | 98 | Impervious Roof |
| * | 13,878 | 98 | Impervious Pavement |
| * | 13,754 | 96 | Gravel |
| * | 15,803 | 98 | Water |
| | 777,230 | 55 | Woods, Good, HSG B |
| | 16,892 | 48 | Brush, Good, HSG B |
| | 1,287,972 | 58 | Meadow, non-grazed, HSG B |
| * | 72,761 | 98 | Impervious Pavement |
| * | 14,040 | 98 | Impervious Roof |
| * | 1,010 | 96 | Gravel |
| | 91,670 | 77 | Woods, Good, HSG D |
| | 16,841 | 73 | Brush, Good, HSG D |
| | 1,693,872 | 78 | Meadow, non-grazed, HSG D |
| | 55,622 | 55 | Woods, Good, HSG B |
| * | 4,369 | 98 | Impervious Pavement |
| | 643,096 | 58 | Meadow, non-grazed, HSG B |
| | 41,645 | 70 | Woods, Good, HSG C |
| | 470,010 | 71 | Meadow, non-grazed, HSG C |
| | 16,260,538 | 70 | Weighted Average |
| | 15,999,883 | | 98.40% Pervious Area |
| | 260,655 | | 1.60% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 277 | 0.0150 | 0.86 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.6 | 778 | 0.0240 | 2.32 | | **Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps |
| 0.3 | 40 | 0.0050 | 2.65 | 8.32 | **Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal |
| 2.1 | 741 | | 5.90 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.8 | 401 | | 3.76 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 0.0 | 18 | 0.0560 | 8.86 | 27.84 | **Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal |
| 2.3 | 605 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 36 | 0.0140 | 4.43 | 13.92 | **Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal |
| 2.3 | 627 | | 4.46 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.1 | 40 | 0.0750 | 10.25 | 32.22 | **Pipe Channel,** 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.025 Corrugated metal |
| 2.1 | 527 | | 4.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 0.2 | 40 | 0.0250 | 3.73 | 2.93 | **Pipe Channel,** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.025 Corrugated metal |
| 4.0 | 593 | | 2.47 | | **Direct Entry, Roadside Ditch** |
| 0.1 | 40 | 0.0250 | 6.87 | 33.72 | **Pipe Channel,** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.025 Corrugated metal |
| 23.2 | 2,925 | | 2.10 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.3 | 7,788 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 70.28 cfs @ 12.30 hrs, Volume= 7.503 af, Depth= 2.34"
Routed to Reach SP4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,333 | 96 | Gravel |
| | 136,520 | 70 | Woods, Good, HSG C |
| * | 438 | 98 | Impervious Pavement |
| * | 6,831 | 98 | Impervious Roof |
| * | 7,136 | 98 | Water |
| | 915,909 | 71 | Meadow, non-grazed, HSG C |
| | 57,613 | 55 | Woods, Good, HSG B |
| * | 1,117 | 98 | Impervious Pavement |
| | 3,366 | 48 | Brush, Good, HSG B |
| * | 813 | 96 | Gravel |
| | 60,234 | 58 | Meadow, non-grazed, HSG B |
| * | 66,794 | 98 | Water |
| | 6,417 | 73 | Brush, Good, HSG D |
| * | 3,263 | 96 | Gravel |
| | 517 | 77 | Woods, Good, HSG D |
| | 199,842 | 78 | Meadow, non-grazed, HSG D |
| | 201,091 | 78 | Meadow, non-grazed, HSG D |
| | 1,679,234 | 73 | Weighted Average |
| | 1,596,918 | | 95.10% Pervious Area |
| | 82,316 | | 4.90% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 12.9 | 842 | 0.0240 | 1.08 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.2 | 311 | | 4.42 | | **Direct Entry, Grassed Waterway** |
| 0.6 | 242 | | 6.54 | | **Direct Entry, Grassed Waterway** |
| 34.3 | 1,495 | Total | | | |

## Summary for Subcatchment 6S:

Runoff = 21.72 cfs @ 12.38 hrs, Volume= 2.579 af, Depth= 2.25"
Routed to Reach SP6 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 23,122 | 70 | Woods, Good, HSG C |
| 31,419 | 65 | Brush, Good, HSG C |
| 437,478 | 71 | Meadow, non-grazed, HSG C |
| 11,524 | 73 | Brush, Good, HSG D |
| 2,524 | 77 | Woods, Good, HSG D |
| 55,990 | 78 | Meadow, non-grazed, HSG D |
| 1,516 | 70 | Woods, Good, HSG C |
| 2,812 | 77 | Woods, Good, HSG D |
| 20,186 | 78 | Meadow, non-grazed, HSG D |
| 12,052 | 71 | Meadow, non-grazed, HSG C |
| 598,623 | 72 | Weighted Average |
| 598,623 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 4.3 | 256 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.5 | 341 | 0.1030 | 2.25 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.4 | 316 | 0.1870 | 2.16 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.8 | 137 | | 1.26 | | **Direct Entry, Grassed Waterway** |
| 39.7 | 1,150 | Total | | | |

## Summary for Subcatchment 7S:

Runoff = 221.62 cfs @ 12.87 hrs, Volume= 42.888 af, Depth= 2.09"
Routed to Reach SP7 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,822,055 | 58 | Meadow, non-grazed, HSG B |
| | 23,489 | 48 | Brush, Good, HSG B |
| | 640,040 | 55 | Woods, Good, HSG B |
| | 2,269,487 | 71 | Meadow, non-grazed, HSG C |
| | 2,183 | 65 | Brush, Good, HSG C |
| | 137,505 | 70 | Woods, Good, HSG C |
| | 2,942,616 | 78 | Meadow, non-grazed, HSG D |
| | 53,119 | 73 | Brush, Good, HSG D |
| | 1,829,743 | 77 | Woods, Good, HSG D |
| * | 11,894 | 98 | Impervious |
| * | 2,632 | 96 | Gravel |
| | 10,734,763 | 70 | Weighted Average |
| | 10,722,869 | | 99.89% Pervious Area |
| | 11,894 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 449 | 0.0390 | 1.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.2 | 512 | 0.0220 | 1.04 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 20.3 | 945 | 0.0240 | 0.77 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 192 | 0.0310 | 0.88 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 14.9 | 3,312 | | 3.70 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.1 | 284 | 0.0530 | 1.15 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.8 | 711 | | 4.30 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 76.1 | 6,505 | Total | | | |

## Summary for Subcatchment 8S:

Runoff = 47.97 cfs @ 12.25 hrs, Volume= 4.667 af, Depth= 2.17"
Routed to Reach SP8 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 0 | 55 | Woods, Good, HSG B |
| * | 1,030 | 98 | Impervious Pavement |
| | 27,402 | 58 | Meadow, non-grazed, HSG B |
| | 15,462 | 77 | Woods, Good, HSG D |
| * | 6,130 | 98 | Impervious Pavement |
| | 200,339 | 78 | Meadow, non-grazed, HSG D |
| | 25,785 | 55 | Woods, Good, HSG B |
| * | 1,580 | 96 | Gravel |
| * | 5,152 | 98 | Impervious Pavement |
| | 191,169 | 58 | Meadow, non-grazed, HSG B |
| * | 7,435 | 98 | Impervious Pavement |
| | 9,470 | 77 | Woods, Good, HSG D |
| | 423,047 | 78 | Meadow, non-grazed, HSG D |
| | 12,817 | 65 | Brush, Good, HSG C |
| * | 2,902 | 98 | Impervious Pavement |
| * | 3,771 | 96 | Gravel |
| * | 670 | 98 | Impervious Roof |
| | 190,360 | 58 | Meadow, non-grazed, HSG B |
| | 1,124,521 | 71 | Weighted Average |
| | 1,101,202 | | 97.93% Pervious Area |
| | 23,319 | | 2.07% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.2 | 100 | 0.0420 | 0.14 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.0 | 364 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 1,017 | | 2.68 | | **Direct Entry, Roadside Ditch** |
| 5.0 | 1,137 | | 3.82 | | **Direct Entry, Roadside Ditch** |
| 29.5 | 2,618 | Total | | | |

## Summary for Subcatchment 9S:

Runoff = 17.57 cfs @ 12.91 hrs, Volume= 3.467 af, Depth= 2.59"
Routed to Reach SP9 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 46,629 | 98 | Water |
| * | 6,554 | 98 | Impervious Pavement |
| | 424,080 | 78 | Meadow, non-grazed, HSG D |
| | 2,058 | 55 | Woods, Good, HSG B |
| | 7,321 | 48 | Brush, Good, HSG B |
| * | 10,739 | 98 | Water |
| * | 1,356 | 98 | Impervious Pavement |
| | 110,953 | 58 | Meadow, non-grazed, HSG B |
| * | 3,190 | 98 | Impervious Pavement |
| | 19,729 | 73 | Brush, Good, HSG D |
| | 66,251 | 78 | Meadow, non-grazed, HSG D |
| | 698,860 | 76 | Weighted Average |
| | 630,392 | | 90.20% Pervious Area |
| | 68,468 | | 9.80% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.0 | 540 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.6 | 572 | | 1.11 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 81.2 | 1,212 | Total | | | |

## Summary for Subcatchment 10S:

Runoff = 36.88 cfs @ 13.03 hrs, Volume= 7.746 af, Depth= 2.59"
Routed to Reach SP10 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 35,373 | 55 | Woods, Good, HSG B |
| 4,798 | 48 | Brush, Good, HSG B |
| 92,207 | 58 | Meadow, non-grazed, HSG B |
| 87,496 | 73 | Brush, Good, HSG D |
| 13,364 | 77 | Woods, Good, HSG D |
| 1,328,032 | 78 | Meadow, non-grazed, HSG D |
| 1,561,270 | 76 | Weighted Average |
| 1,561,270 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.6 | 100 | 0.0010 | 0.03 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 16.9 | 388 | 0.0030 | 0.38 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 33 | 0.0610 | 1.23 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 3.6 | 165 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.2 | 310 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 8.2 | 920 | | 1.88 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 1.5 | 295 | | 3.39 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 88.4 | 2,211 | Total | | | |

## Summary for Subcatchment 11S:

Runoff = 23.21 cfs @ 12.41 hrs, Volume= 2.854 af, Depth= 2.86"
Routed to Reach SP11 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 17,843 | 98 | Paved parking, HSG D |
| 501,616 | 78 | Meadow, non-grazed, HSG D |
| 1,885 | 73 | Brush, Good, HSG D |
| 521,344 | 79 | Weighted Average |
| 503,501 | | 96.58% Pervious Area |
| 17,843 | | 3.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.2 | 100 | 0.0120 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 11.8 | 521 | 0.0110 | 0.73 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.1 | 418 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,039 | Total | | | |

## Summary for Subcatchment 12S:

Runoff = 31.94 cfs @ 13.23 hrs, Volume= 7.621 af, Depth= 2.77"
Routed to Reach SP12 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,897 | 98 | Impervious |
| | 8,690 | 58 | Meadow, non-grazed, HSG B |
| | 1,313,095 | 78 | Meadow, non-grazed, HSG D |
| | 5,821 | 73 | Brush, Good, HSG D |
| | 101,013 | 77 | Woods, Good, HSG D |
| | 1,437,516 | 78 | Weighted Average |
| | 1,428,619 | | 99.38% Pervious Area |
| | 8,897 | | 0.62% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 30.7 | 100 | 0.0470 | 0.05 | | **Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.40" |
| 25.9 | 601 | 0.0060 | 0.39 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 48.0 | 1,687 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 104.6 | 2,388 | Total | | | |

## Summary for Subcatchment 13S:

Runoff = 54.39 cfs @ 12.98 hrs, Volume= 11.093 af, Depth= 2.42"
Routed to Reach SP13 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 279,893 | 58 | Meadow, non-grazed, HSG B |
| 1,558,214 | 78 | Meadow, non-grazed, HSG D |
| 424 | 48 | Brush, Good, HSG B |
| 77,097 | 73 | Brush, Good, HSG D |
| 142,209 | 55 | Woods, Good, HSG B |
| 337,975 | 77 | Woods, Good, HSG D |
| 2,395,812 | 74 | Weighted Average |
| 2,395,812 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.6 | 100 | 0.0230 | 0.11 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 48.9 | 1,838 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 19.7 | 418 | 0.0050 | 0.35 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 84.2 | 2,356 | Total | | | |

## Summary for Subcatchment 14S:

Runoff = 23.15 cfs @ 12.33 hrs, Volume= 2.563 af, Depth= 2.59"
Routed to Reach SP14 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,018 | 98 | Impervious |
| | 70,714 | 58 | Meadow, non-grazed, HSG B |
| | 428,883 | 78 | Meadow, non-grazed, HSG D |
| | 744 | 48 | Brush, Good, HSG B |
| | 189 | 73 | Brush, Good, HSG D |
| | 7,102 | 77 | Woods, Good, HSG D |
| | 516,650 | 76 | Weighted Average |
| | 507,632 | | 98.25% Pervious Area |
| | 9,018 | | 1.75% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.1 | 835 | 0.0120 | 0.77 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 36.6 | 935 | Total | | | |

## Summary for Subcatchment 15S:

Runoff = 10.85 cfs @ 12.27 hrs, Volume= 1.118 af, Depth= 1.78"
Routed to Reach SP15 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 4,081 | 98 | Impervious |
| | 181,283 | 58 | Meadow, non-grazed, HSG B |
| | 126,101 | 78 | Meadow, non-grazed, HSG D |
| | 6,560 | 48 | Brush, Good, HSG B |
| | 2,092 | 73 | Brush, Good, HSG D |
| | 5,023 | 55 | Woods, Good, HSG B |
| | 4,083 | 77 | Woods, Good, HSG D |
| | 329,223 | 66 | Weighted Average |
| | 325,142 | | 98.76% Pervious Area |
| | 4,081 | | 1.24% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.9 | 100 | 0.0220 | 0.11 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 387 | 0.0210 | 1.01 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3 | 220 | 0.0040 | 0.44 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 30.6 | 707 | Total | | | |

## Summary for Subcatchment 16S:

Runoff = 39.01 cfs @ 12.61 hrs, Volume= 6.015 af, Depth= 2.77"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 12,714 | 98 | Impervious |
| | 25,066 | 71 | Meadow, non-grazed, HSG C |
| | 938,415 | 78 | Meadow, non-grazed, HSG D |
| | 3,358 | 73 | Brush, Good, HSG D |
| | 863 | 70 | Woods, Good, HSG C |
| | 154,192 | 77 | Woods, Good, HSG D |
| | 1,134,608 | 78 | Weighted Average |
| | 1,121,894 | | 98.88% Pervious Area |
| | 12,714 | | 1.12% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.0 | 100 | 0.0170 | 0.06 | | **Sheet Flow,** Grass: Bermuda n= 0.410 P2= 2.40" |
| 3.8 | 142 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 26.0 | 1,035 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.0 | 334 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.8 | 1,611 | Total | | | |

## Summary for Subcatchment 16SA:

Runoff = 27.80 cfs @ 12.37 hrs, Volume= 3.261 af, Depth= 2.59"
Routed to Reach SP16 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 11,093 | 98 | Impervious |
| | 70,093 | 58 | Meadow, non-grazed, HSG B |
| | 359,929 | 78 | Meadow, non-grazed, HSG D |
| | 259 | 48 | Brush, Good, HSG B |
| | 14,806 | 73 | Brush, Good, HSG D |
| | 0 | 70 | Woods, Good, HSG C |
| | 201,078 | 77 | Woods, Good, HSG D |
| | 657,258 | 76 | Weighted Average |
| | 646,165 | | 98.31% Pervious Area |
| | 11,093 | | 1.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.9 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 17S:

Runoff = 159.48 cfs @ 13.09 hrs, Volume= 35.131 af, Depth= 2.68"
Routed to Reach SP17 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 22,601 | 98 | Water Surface, HSG A |
| * | 17,632 | 98 | Impervious |
| | 252,955 | 71 | Meadow, non-grazed, HSG C |
| | 4,937,352 | 78 | Meadow, non-grazed, HSG D |
| | 16,810 | 65 | Brush, Good, HSG C |
| | 130,011 | 73 | Brush, Good, HSG D |
| | 111,819 | 70 | Woods, Good, HSG C |
| | 1,358,748 | 77 | Woods, Good, HSG D |
| | 6,847,928 | 77 | Weighted Average |
| | 6,807,695 | | 99.41% Pervious Area |
| | 40,233 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.1 | 50 | 0.0300 | 0.07 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 10.9 | 50 | 0.0140 | 0.08 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 32.6 | 2,373 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 33.8 | 1,418 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 5.1 | 845 | | 2.74 | | **Direct Entry, Small Tributary & Swamp w/Channels** |
| 94.5 | 4,736 | Total | | | |

## Summary for Subcatchment 18S:

Runoff = 121.31 cfs @ 12.72 hrs, Volume= 20.529 af, Depth= 2.68"
Routed to Reach SP18 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,953 | 98 | Water Surface, HSG A |
| * | 13,432 | 98 | Impervious |
| | 5,975 | 58 | Meadow, non-grazed, HSG B |
| | 29,944 | 71 | Meadow, non-grazed, HSG C |
| | 2,207,221 | 78 | Meadow, non-grazed, HSG D |
| | 157,865 | 73 | Brush, Good, HSG D |
| | 23,440 | 55 | Woods, Good, HSG B |
| | 321,869 | 70 | Woods, Good, HSG C |
| | 1,238,903 | 77 | Woods, Good, HSG D |
| | 4,001,602 | 77 | Weighted Average |
| | 3,985,217 | | 99.59% Pervious Area |
| | 16,385 | | 0.41% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 27.8 | 100 | 0.0150 | 0.06 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 6.8 | 205 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 23.6 | 2,144 | 0.0920 | 1.52 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.2 | 1,440 | | 2.92 | | **Direct Entry, Ditch** |
| 66.4 | 3,889 | Total | | | |

## Summary for Subcatchment 19S:

Runoff = 126.47 cfs @ 12.90 hrs, Volume= 24.949 af, Depth= 2.59"
Routed to Reach SP19 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 29,609 | 98 | Impervious |
| | 21,503 | 96 | Gravel surface, HSG A |
| | 84,734 | 58 | Meadow, non-grazed, HSG B |
| | 89,335 | 71 | Meadow, non-grazed, HSG C |
| | 2,422,408 | 78 | Meadow, non-grazed, HSG D |
| | 10,082 | 48 | Brush, Good, HSG B |
| | 74,495 | 73 | Brush, Good, HSG D |
| | 16,971 | 55 | Woods, Good, HSG B |
| | 681,805 | 70 | Woods, Good, HSG C |
| | 1,597,828 | 77 | Woods, Good, HSG D |
| | 5,028,770 | 76 | Weighted Average |
| | 4,999,161 | | 99.41% Pervious Area |
| | 29,609 | | 0.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 32.7 | 100 | 0.0100 | 0.05 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 21.4 | 1,915 | 0.0890 | 1.49 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.3 | 706 | 0.0720 | 1.88 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 3.7 | 109 | 0.0050 | 0.49 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 2.9 | 244 | 0.0410 | 1.42 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 7.2 | 706 | | 1.63 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 6.7 | 923 | | 2.30 | | **Direct Entry, Small Tributary & Swamps w/ Channels** |
| 80.9 | 4,703 | Total | | | |

## Summary for Subcatchment 20S:

Runoff = 63.77 cfs @ 12.78 hrs, Volume= 11.482 af, Depth= 2.42"
Routed to Reach SP20 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 16,368 | 98 | Water Surface, HSG A |
| * | 38,886 | 98 | Impervious |
| | 503 | 96 | Gravel surface, HSG A |
| | 99,447 | 30 | Meadow, non-grazed, HSG A |
| | 58,596 | 58 | Meadow, non-grazed, HSG B |
| | 130,201 | 71 | Meadow, non-grazed, HSG C |
| | 1,680,681 | 78 | Meadow, non-grazed, HSG D |
| | 21,162 | 73 | Brush, Good, HSG D |
| | 131,716 | 55 | Woods, Good, HSG B |
| | 6,015 | 70 | Woods, Good, HSG C |
| | 296,222 | 77 | Woods, Good, HSG D |
| | 2,479,797 | 74 | Weighted Average |
| | 2,424,543 | | 97.77% Pervious Area |
| | 55,254 | | 2.23% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 71.1 | | | | | **Direct Entry, SEE SPREDSHEET** |

## Summary for Subcatchment 21S:

Runoff = 12.32 cfs @ 12.28 hrs, Volume= 1.278 af, Depth= 2.01"
Routed to Reach SP21 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 28,890 | 30 | Meadow, non-grazed, HSG A |
| 262,110 | 71 | Meadow, non-grazed, HSG C |
| 12,438 | 78 | Meadow, non-grazed, HSG D |
| 683 | 30 | Brush, Good, HSG A |
| 5,947 | 65 | Brush, Good, HSG C |
| 1,322 | 30 | Woods, Good, HSG A |
| 21,219 | 98 | Paved roads w/curbs & sewers, HSG A |
| 332,609 | 69 | Weighted Average |
| 311,390 | | 93.62% Pervious Area |
| 21,219 | | 6.38% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 12.4 | 100 | 0.0410 | 0.13 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 19.5 | 821 | 0.0100 | 0.70 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 31.9 | 921 | Total | | | |

## Summary for Subcatchment 22S:

Runoff = 20.19 cfs @ 12.56 hrs, Volume= 3.019 af, Depth= 2.01"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 87,197 | 30 | Meadow, non-grazed, HSG A |
| 418,867 | 71 | Meadow, non-grazed, HSG C |
| 134,602 | 78 | Meadow, non-grazed, HSG D |
| 814 | 65 | Brush, Good, HSG C |
| 7,253 | 73 | Brush, Good, HSG D |
| 843 | 30 | Woods, Good, HSG A |
| 3,389 | 70 | Woods, Good, HSG C |
| 126,479 | 77 | Woods, Good, HSG D |
| 6,200 | 98 | Paved roads w/curbs & sewers, HSG A |
| 785,644 | 69 | Weighted Average |
| 779,444 | | 99.21% Pervious Area |
| 6,200 | | 0.79% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 28.7 | 100 | 0.0050 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 22.4 | 1,072 | 0.0130 | 0.80 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.8 | 83 | 0.1330 | 1.82 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 1.4 | 184 | | 2.20 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 53.3 | 1,439 | Total | | | |

## Summary for Subcatchment 23S:

Runoff = 406.51 cfs @ 13.02 hrs, Volume= 85.840 af, Depth= 2.59"
Routed to Reach SP23 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 33,228 | 30 | Meadow, non-grazed, HSG A |
| 494,460 | 71 | Meadow, non-grazed, HSG C |
| 7,349,351 | 78 | Meadow, non-grazed, HSG D |
| 299,742 | 65 | Brush, Good, HSG C |
| 1,788,044 | 73 | Brush, Good, HSG D |
| 1,493,479 | 70 | Woods, Good, HSG C |
| 5,745,558 | 77 | Woods, Good, HSG D |
| 73,510 | 98 | Paved roads w/curbs & sewers, HSG D |
| 25,027 | 96 | Gravel surface, HSG D |
| 17,302,399 | 76 | Weighted Average |
| 17,228,889 | | 99.58% Pervious Area |
| 73,510 | | 0.42% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.4 | 100 | 0.0420 | 0.09 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 22.2 | 1,941 | 0.0850 | 1.46 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.2 | 806 | 0.0580 | 1.20 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 11.6 | 1,740 | | 2.49 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.2 | 1,229 | | 4.93 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 9.5 | 1,895 | | 3.32 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 3.8 | 650 | | 2.82 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 7.8 | 770 | | 1.64 | | **Direct Entry, Roadside Ditch** |
| 88.7 | 9,131 | Total | | | |

## Summary for Subcatchment 24S:

Runoff = 14.48 cfs @ 12.26 hrs, Volume= 1.429 af, Depth= 2.86"
Routed to Reach SP24 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 226,229 | 78 | Meadow, non-grazed, HSG D |
| 7,721 | 73 | Brush, Good, HSG D |
| 10,176 | 77 | Woods, Good, HSG D |
| 16,779 | 98 | Paved roads w/curbs & sewers, HSG D |
| 260,905 | 79 | Weighted Average |
| 244,126 | | 93.57% Pervious Area |
| 16,779 | | 6.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 15.1 | 100 | 0.0250 | 0.11 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 14.0 | 830 | 0.0200 | 0.99 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 2.1 | 270 | | 2.17 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 31.2 | 1,200 | Total | | | |

## Summary for Subcatchment 25S:

Runoff = 284.98 cfs @ 12.78 hrs, Volume= 51.029 af, Depth= 2.51"
Routed to Reach SP25 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 816,850 | 58 | Meadow, non-grazed, HSG B |
| 955,101 | 71 | Meadow, non-grazed, HSG C |
| 5,104,595 | 78 | Meadow, non-grazed, HSG D |
| 18,372 | 48 | Brush, Good, HSG B |
| 265,288 | 73 | Brush, Good, HSG D |
| 189,511 | 55 | Woods, Good, HSG B |
| 3,244,843 | 77 | Woods, Good, HSG D |
| 29,278 | 98 | Paved roads w/curbs & sewers, HSG D |
| 19,569 | 96 | Gravel surface, HSG D |
| 10,643,407 | 75 | Weighted Average |
| 10,614,129 | | 99.72% Pervious Area |
| 29,278 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.8 | 100 | 0.0190 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 18.9 | 1,281 | 0.0510 | 1.13 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 8.8 | 640 | 0.0300 | 1.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 17.1 | 4,093 | | 3.98 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.6 | 482 | | 1.76 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 4.8 | 682 | | 2.39 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 71.0 | 7,278 | Total | | | |

## Summary for Subcatchment 26S:

Runoff = 35.47 cfs @ 12.41 hrs, Volume= 4.368 af, Depth= 2.77"
Routed to Reach SP26 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 75,400 | 77 | Woods, Good, HSG D |
| * | 4,254 | 98 | Water |
| | 50,954 | 71 | Meadow, non-grazed, HSG C |
| * | 18,174 | 98 | Impervious Pavement |
| | 675,212 | 78 | Meadow, non-grazed, HSG D |
| | 823,994 | 78 | Weighted Average |
| | 801,566 | | 97.28% Pervious Area |
| | 22,428 | | 2.72% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 18.5 | 100 | 0.0150 | 0.09 | | **Sheet Flow,**<br>Grass: Dense n= 0.240 P2= 2.40" |
| 5.4 | 527 | | 1.64 | | **Direct Entry, Ditch** |
| 19.2 | 720 | 0.0080 | 0.63 | | **Shallow Concentrated Flow,**<br>Short Grass Pasture Kv= 7.0 fps |
| 43.1 | 1,347 | Total | | | |

## Summary for Subcatchment 27S:

Runoff = 41.02 cfs @ 12.46 hrs, Volume= 5.469 af, Depth= 2.17"
Routed to Reach SP27 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 102,395 | 30 | Meadow, non-grazed, HSG A |
| 70,249 | 58 | Meadow, non-grazed, HSG B |
| 356,229 | 71 | Meadow, non-grazed, HSG C |
| 594,316 | 78 | Meadow, non-grazed, HSG D |
| 15,001 | 48 | Brush, Good, HSG B |
| 136 | 65 | Brush, Good, HSG C |
| 35,121 | 73 | Brush, Good, HSG D |
| 1,761 | 30 | Woods, Good, HSG A |
| 10,015 | 55 | Woods, Good, HSG B |
| 44,190 | 70 | Woods, Good, HSG C |
| 27,054 | 77 | Woods, Good, HSG D |
| 53,425 | 98 | Paved roads w/curbs & sewers, HSG A |
| 7,743 | 96 | Gravel surface, HSG A |
| 1,317,635 | 71 | Weighted Average |
| 1,264,210 | | 95.95% Pervious Area |
| 53,425 | | 4.05% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 11.4 | 100 | 0.0500 | 0.15 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 7.4 | 973 | 0.0970 | 2.18 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.4 | 548 | 0.0820 | 1.43 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 2.0 | 152 | 0.0330 | 1.27 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 12.9 | 824 | 0.0230 | 1.06 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 6.3 | 510 | | 1.34 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 46.4 | 3,107 | Total | | | |

## Summary for Subcatchment 28S:

Runoff = 123.53 cfs @ 12.29 hrs, Volume= 12.815 af, Depth= 2.34"
Routed to Reach SP28 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 148,045 | 58 | Meadow, non-grazed, HSG B |
| | 1,391,071 | 71 | Meadow, non-grazed, HSG C |
| | 1,142,501 | 78 | Meadow, non-grazed, HSG D |
| | 16,837 | 48 | Brush, Good, HSG B |
| | 158 | 65 | Brush, Good, HSG C |
| | 36,741 | 73 | Brush, Good, HSG D |
| | 39,665 | 55 | Woods, Good, HSG B |
| | 794 | 70 | Woods, Good, HSG C |
| | 51,395 | 77 | Woods, Good, HSG D |
| * | 40,923 | 98 | Impervious Surface |
| | 2,868,130 | 73 | Weighted Average |
| | 2,827,207 | | 98.57% Pervious Area |
| | 40,923 | | 1.43% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 19.6 | 100 | 0.0130 | 0.09 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 2.3 | 163 | 0.0290 | 1.19 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 11.0 | 2,559 | | 3.88 | | **Direct Entry, Roadside Ditch** |
| 32.9 | 2,822 | Total | | | |

## Summary for Subcatchment 29S:

Runoff = 42.16 cfs @ 12.18 hrs, Volume= 3.593 af, Depth= 2.42"
Routed to Reach SP29 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 34,206 | 70 | Woods, Good, HSG C |
| * | 7,569 | 98 | Impervious Pavement |
| * | 4,117 | 98 | Impervious Roof |
| * | 5,127 | 96 | Gravel |
| | 247,913 | 71 | Meadow, non-grazed, HSG C |
| | 11,168 | 55 | Woods, Good, HSG B |
| | 740 | 65 | Brush, Good, HSG C |
| | 9,072 | 48 | Brush, Good, HSG B |
| * | 428 | 98 | Impervious Roof |
| | 56,539 | 58 | Meadow, non-grazed, HSG B |
| * | 8,416 | 98 | Impervious Pavement |
| | 16,068 | 77 | Woods, Good, HSG D |
| | 374,759 | 78 | Meadow, non-grazed, HSG D |
| | 776,122 | 74 | Weighted Average |
| | 755,592 | | 97.35% Pervious Area |
| | 20,530 | | 2.65% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 10.3 | 100 | 0.0650 | 0.16 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 0.5 | 63 | 0.0950 | 2.16 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 31 | 0.1290 | 1.80 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.1 | 612 | 0.0570 | 1.67 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.1 | 31 | 0.6100 | 3.91 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 7.1 | 900 | | 2.12 | | **Direct Entry, Roadside Ditch** |
| 24.4 | 1,737 | Total | | | |

## Summary for Subcatchment 30S:

Runoff = 22.97 cfs @ 12.36 hrs, Volume= 2.664 af, Depth= 2.25"
Routed to Reach SP30 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 511,468 | 71 | Meadow, non-grazed, HSG C |
| | 80,980 | 78 | Meadow, non-grazed, HSG D |
| | 16,758 | 70 | Woods, Good, HSG C |
| * | 9,244 | 98 | Impervious Surface |
| | 618,450 | 72 | Weighted Average |
| | 609,206 | | 98.51% Pervious Area |
| | 9,244 | | 1.49% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 26.7 | 100 | 0.0060 | 0.06 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 10.4 | 1,152 | 0.0700 | 1.85 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.3 | 175 | | 2.28 | | **Direct Entry, Roadside Ditch** |
| 38.4 | 1,427 | Total | | | |

## Summary for Subcatchment 31S:

Runoff = 86.25 cfs @ 12.64 hrs, Volume= 13.805 af, Depth= 2.42"
Routed to Reach SP31 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 66,905 | 58 | Meadow, non-grazed, HSG B |
| | 1,185,943 | 71 | Meadow, non-grazed, HSG C |
| | 1,398,406 | 78 | Meadow, non-grazed, HSG D |
| | 1,947 | 73 | Brush, Good, HSG D |
| | 84,560 | 55 | Woods, Good, HSG B |
| | 17,524 | 70 | Woods, Good, HSG C |
| | 213,262 | 77 | Woods, Good, HSG D |
| * | 13,041 | 98 | Impervious Surface |
| | 2,981,588 | 74 | Weighted Average |
| | 2,968,547 | | 99.56% Pervious Area |
| | 13,041 | | 0.44% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 35.2 | 100 | 0.0030 | 0.05 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.2 | 219 | 0.0070 | 0.59 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 8.4 | 252 | 0.0100 | 0.50 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 6.7 | 592 | 0.0440 | 1.47 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 4.2 | 722 | | 2.87 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 60.7 | 1,885 | Total | | | |

## Summary for Subcatchment 32S:

Runoff = 65.60 cfs @ 12.90 hrs, Volume= 13.299 af, Depth= 1.63"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 2,541,060 | 58 | Meadow, non-grazed, HSG B |
| | 716,554 | 71 | Meadow, non-grazed, HSG C |
| | 517,326 | 78 | Meadow, non-grazed, HSG D |
| | 869 | 48 | Brush, Good, HSG B |
| | 3,094 | 65 | Brush, Good, HSG C |
| | 4,465 | 73 | Brush, Good, HSG D |
| | 200,046 | 55 | Woods, Good, HSG B |
| | 46,472 | 70 | Woods, Good, HSG C |
| | 208,119 | 77 | Woods, Good, HSG D |
| * | 33,483 | 98 | Impervious Surface |
| | 3,270 | 96 | Gravel surface, HSG A |
| | 4,274,758 | 64 | Weighted Average |
| | 4,241,275 | | 99.22% Pervious Area |
| | 33,483 | | 0.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 16.5 | 100 | 0.0200 | 0.10 | | **Sheet Flow,** Grass: Dense n= 0.240 P2= 2.40" |
| 6.4 | 848 | 0.1000 | 2.21 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 52.3 | 2,083 | 0.0090 | 0.66 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 75.2 | 3,031 | Total | | | |

## Summary for Subcatchment 33S:

Runoff = 102.33 cfs @ 12.64 hrs, Volume= 16.528 af, Depth= 1.93"
Routed to Reach SP33 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 1,722,412 | 58 | Meadow, non-grazed, HSG B |
| 1,542,409 | 78 | Meadow, non-grazed, HSG D |
| 1,381 | 73 | Brush, Good, HSG D |
| 384,753 | 55 | Woods, Good, HSG B |
| 826,436 | 77 | Woods, Good, HSG D |
| 4,477,391 | 68 | Weighted Average |
| 4,477,391 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.1 | 100 | 0.0340 | 0.08 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 24.6 | 932 | 0.0160 | 0.63 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 12.8 | 1,157 | 0.0460 | 1.50 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.4 | 60 | 0.3120 | 2.79 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 0.7 | 141 | | 3.19 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 58.6 | 2,390 | Total | | | |

## Summary for Subcatchment 34S:

Runoff = 55.38 cfs @ 12.41 hrs, Volume= 6.885 af, Depth= 2.17"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 20,254 | 58 | Meadow, non-grazed, HSG B |
| 937,330 | 78 | Meadow, non-grazed, HSG D |
| 16,371 | 48 | Brush, Good, HSG B |
| 35,437 | 73 | Brush, Good, HSG D |
| 429,230 | 55 | Woods, Good, HSG B |
| 220,205 | 77 | Woods, Good, HSG D |
| 1,658,827 | 71 | Weighted Average |
| 1,658,827 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 20.5 | 100 | 0.0320 | 0.08 | | **Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.40" |
| 2.9 | 130 | 0.0220 | 0.74 | | **Shallow Concentrated Flow,** Woodland Kv= 5.0 fps |
| 18.3 | 1,058 | 0.0190 | 0.96 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 0.3 | 155 | | 8.93 | | **Direct Entry, Small tributary & Swamp w/channels** |
| 42.0 | 1,443 | Total | | | |

## Summary for Subcatchment 35S:

Runoff = 147.83 cfs @ 12.20 hrs, Volume= 13.072 af, Depth= 2.59"
Routed to Reach SP35 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 32,311 | 58 | Meadow, non-grazed, HSG B |
| 36,347 | 71 | Meadow, non-grazed, HSG C |
| 1,445,641 | 78 | Meadow, non-grazed, HSG D |
| 26,860 | 73 | Brush, Good, HSG D |
| 450,341 | 55 | Woods, Good, HSG B |
| 79,608 | 70 | Woods, Good, HSG C |
| 204,736 | 77 | Woods, Good, HSG D |
| 282,102 | 98 | Paved roads w/curbs & sewers, HSG D |
| 76,832 | 96 | Gravel surface, HSG D |
| 2,634,778 | 76 | Weighted Average |
| 2,352,676 | | 89.29% Pervious Area |
| 282,102 | | 10.71% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 2.4 | 100 | 0.0050 | 0.68 | | **Sheet Flow,** Smooth surfaces n= 0.011 P2= 2.40" |
| 2.6 | 755 | 0.0590 | 4.93 | | **Shallow Concentrated Flow,** Paved Kv= 20.3 fps |
| 2.5 | 438 | | 2.91 | | **Direct Entry,** |
| 17.6 | 1,445 | 0.0380 | 1.36 | | **Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps |
| 1.0 | 351 | | 5.94 | | **Direct Entry, Small Tributary & Swamp w/ Channels** |
| 26.1 | 3,089 | Total | | | |

## Summary for Subcatchment 36S:

Runoff = 301.27 cfs @ 12.35 hrs, Volume= 34.359 af, Depth= 2.68"
Routed to Reach SP36 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 52,184 | 58 | Meadow, non-grazed, HSG B |
| 695 | 71 | Meadow, non-grazed, HSG C |
| 5,121,405 | 78 | Meadow, non-grazed, HSG D |
| 1,145 | 48 | Brush, Good, HSG B |
| 33,870 | 73 | Brush, Good, HSG D |
| 278,876 | 55 | Woods, Good, HSG B |
| 346,117 | 70 | Woods, Good, HSG C |
| 782,902 | 77 | Woods, Good, HSG D |
| 65,616 | 98 | Paved roads w/curbs & sewers, HSG D |
| 14,651 | 96 | Gravel surface, HSG D |
| 6,697,461 | 77 | Weighted Average |
| 6,631,845 | | 99.02% Pervious Area |
| 65,616 | | 0.98% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.4 | | | | | **Direct Entry, SEE SPREADHSEET** |

## Summary for Subcatchment 37S:

Runoff = 174.46 cfs @ 12.36 hrs, Volume= 20.304 af, Depth= 2.68"
Routed to Reach SP37 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 30,667 | 98 | Impervious |
| | 13,321 | 96 | Gravel surface, HSG A |
| * | 7,485 | 98 | Water |
| | 57,778 | 58 | Meadow, non-grazed, HSG B |
| | 3,215,975 | 78 | Meadow, non-grazed, HSG D |
| | 805 | 48 | Brush, Good, HSG B |
| | 915 | 73 | Brush, Good, HSG D |
| | 76,106 | 55 | Woods, Good, HSG B |
| | 148,513 | 70 | Woods, Good, HSG C |
| | 406,259 | 77 | Woods, Good, HSG D |
| | 3,957,824 | 77 | Weighted Average |
| | 3,919,672 | | 99.04% Pervious Area |
| | 38,152 | | 0.96% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 39.6 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 38S:

Runoff = 33.18 cfs @ 12.35 hrs, Volume= 3.768 af, Depth= 2.68"
Routed to Reach SP38 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 355,232 | 78 | Meadow, non-grazed, HSG D |
| 379,321 | 77 | Woods, Good, HSG D |
| 734,553 | 77 | Weighted Average |
| 734,553 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 38.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 39S:

Runoff = 75.20 cfs @ 12.56 hrs, Volume= 11.149 af, Depth= 2.34"
Routed to Reach SP39 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| | 113,238 | 30 | Woods, Good, HSG A |
| * | 17,184 | 98 | Impervious Pavement |
| | 149,774 | 30 | Meadow, non-grazed, HSG A |
| | 11,690 | 30 | Brush, Good, HSG A |
| | 30,170 | 70 | Woods, Good, HSG C |
| | 7,231 | 71 | Meadow, non-grazed, HSG C |
| | 194,104 | 77 | Woods, Good, HSG D |
| | 70,193 | 73 | Brush, Good, HSG D |
| * | 2,287 | 96 | Gravel |
| | 1,899,537 | 78 | Meadow, non-grazed, HSG D |
| | 2,495,408 | 73 | Weighted Average |
| | 2,478,224 | | 99.31% Pervious Area |
| | 17,184 | | 0.69% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 54.4 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 40S:

Runoff = 116.03 cfs @ 12.46 hrs, Volume= 15.258 af, Depth= 2.77"
Routed to Reach SP40 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,987 | 98 | Impervious Pavement |
| | 171,417 | 77 | Woods, Good, HSG D |
| | 20,992 | 73 | Brush, Good, HSG D |
| | 2,658,700 | 78 | Meadow, non-grazed, HSG D |
| | 2,878,096 | 78 | Weighted Average |
| | 2,851,109 | | 99.06% Pervious Area |
| | 26,987 | | 0.94% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 47.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 41S:

Runoff = 32.59 cfs @ 12.46 hrs, Volume= 4.322 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,863 | 98 | Impervious |
| * | 44,367 | 96 | Gravel |
| | 50,657 | 58 | Meadow, non-grazed, HSG B |
| | 654,398 | 71 | Meadow, non-grazed, HSG C |
| | 153,128 | 78 | Meadow, non-grazed, HSG D |
| | 12,946 | 55 | Woods, Good, HSG B |
| | 30,598 | 70 | Woods, Good, HSG C |
| | 0 | 77 | Woods, Good, HSG D |
| | 33,461 | 61 | >75% Grass cover, Good, HSG B |
| | 6,740 | 74 | >75% Grass cover, Good, HSG C |
| | 1,003,158 | 72 | Weighted Average |
| | 986,295 | | 98.32% Pervious Area |
| | 16,863 | | 1.68% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 46.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 42S:

Runoff = 172.59 cfs @ 13.13 hrs, Volume= 38.540 af, Depth= 2.68"
Routed to Reach SP42 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 20,734 | 98 | Water Surface, HSG A |
| 170,414 | 96 | Gravel surface, HSG A |
| 956,587 | 71 | Meadow, non-grazed, HSG C |
| 5,227,848 | 78 | Meadow, non-grazed, HSG D |
| 287 | 65 | Brush, Good, HSG C |
| 56,930 | 73 | Brush, Good, HSG D |
| 32,944 | 70 | Woods, Good, HSG C |
| 1,046,689 | 77 | Woods, Good, HSG D |
| 7,512,433 | 77 | Weighted Average |
| 7,491,699 | | 99.72% Pervious Area |
| 20,734 | | 0.28% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 96.3 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 43S:

Runoff = 100.68 cfs @ 12.49 hrs, Volume= 13.574 af, Depth= 2.68"
Routed to Reach SP43 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 2,810 | 98 | Impervious |
| | 440,724 | 71 | Meadow, non-grazed, HSG C |
| | 2,172,158 | 78 | Meadow, non-grazed, HSG D |
| | 11,726 | 70 | Woods, Good, HSG C |
| | 18,430 | 77 | Woods, Good, HSG D |
| | 2,645,848 | 77 | Weighted Average |
| | 2,643,038 | | 99.89% Pervious Area |
| | 2,810 | | 0.11% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 48.7 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44S:

Runoff = 120.52 cfs @ 13.11 hrs, Volume= 27.177 af, Depth= 2.77"
Routed to Reach SP44 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 136,522 | 98 | Water |
| * | 27,820 | 98 | Impervious |
| * | 4,835 | 96 | Gravel |
| | 146,073 | 58 | Meadow, non-grazed, HSG B |
| | 90,051 | 71 | Meadow, non-grazed, HSG C |
| | 4,232,980 | 78 | Meadow, non-grazed, HSG D |
| | 82,986 | 73 | Brush, Good, HSG D |
| | 6,012 | 55 | Woods, Good, HSG B |
| | 3,850 | 70 | Woods, Good, HSG C |
| | 395,055 | 77 | Woods, Good, HSG D |
| | 5,126,184 | 78 | Weighted Average |
| | 4,961,842 | | 96.79% Pervious Area |
| | 164,342 | | 3.21% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 97.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 44SA:

Runoff = 47.87 cfs @ 12.19 hrs, Volume= 4.164 af, Depth= 2.77"
Routed to Reach SP44A :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 8,459 | 98 | Water |
| * | 21,218 | 98 | Impervious |
| * | 12,958 | 96 | Gravel |
| | 4,574 | 58 | Meadow, non-grazed, HSG B |
| | 57,514 | 71 | Meadow, non-grazed, HSG C |
| | 588,570 | 78 | Meadow, non-grazed, HSG D |
| | 988 | 48 | Brush, Good, HSG B |
| | 17,587 | 73 | Brush, Good, HSG D |
| | 2,222 | 55 | Woods, Good, HSG B |
| | 22,179 | 70 | Woods, Good, HSG C |
| | 49,212 | 77 | Woods, Good, HSG D |
| | 785,481 | 78 | Weighted Average |
| | 755,804 | | 96.22% Pervious Area |
| | 29,677 | | 3.78% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 25.5 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 45S:

Runoff = 34.82 cfs @ 12.23 hrs, Volume= 3.289 af, Depth= 2.95"
Routed to nonexistent node SP46

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 49,323 | 98 | Impervious |
| | 33,429 | 77 | Woods, Good, HSG D |
| | 12,134 | 73 | Brush, Good, HSG D |
| * | 720 | 96 | Gravel |
| | 478,790 | 78 | Meadow, non-grazed, HSG D |
| * | 7,562 | 98 | Water |
| | 581,958 | 80 | Weighted Average |
| | 525,073 | | 90.23% Pervious Area |
| | 56,885 | | 9.77% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 29.1 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 46S:

Runoff = 70.08 cfs @ 12.55 hrs, Volume= 10.231 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| Area (sf) | CN | Description |
|---|---|---|
| 367,923 | 77 | Woods, Good, HSG D |
| 229,882 | 55 | Woods, Good, HSG B |
| 1,508,838 | 78 | Meadow, non-grazed, HSG D |
| 27,326 | 73 | Brush, Good, HSG D |
| 2,133,969 | 75 | Weighted Average |
| 2,133,969 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 53.8 | | | | | **Direct Entry, SEE SPREADSHEET** |

## Summary for Subcatchment 47S:

Runoff = 81.11 cfs @ 12.59 hrs, Volume= 12.158 af, Depth= 2.77"
Routed to Reach SP47 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-yr Rainfall=5.07"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 23,846 | 98 | Impervious |
| * | 10,900 | 96 | Gravel |
| | 2,186,703 | 78 | Meadow, non-grazed, HSG D |
| | 15,310 | 73 | Brush, Good, HSG D |
| | 56,459 | 77 | Woods, Good, HSG D |
| | 2,293,218 | 78 | Weighted Average |
| | 2,269,372 | | 98.96% Pervious Area |
| | 23,846 | | 1.04% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 56.5 | | | | | **Direct Entry, SEE SPREADSHEET** |