# Water Quality:

## 1.0 Water Quality Protection Volume and Peak Flow
## 2.0 Construction SWPPP Guidelines and Form

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# 1.0 Water Quality Protection Volume and Peak Flow

## 1.1 Introduction

Hydrologic studies show smaller, frequently occurring storms account for the majority of rainfall events. Consequently, the runoff from the many smaller storms also accounts for a major portion of the annual pollutant loadings. By treating these frequently occurring, smaller rainfall events and the initial portion of the stormwater runoff from larger events, it is possible to effectively mitigate the water quality impacts from a developed area.

## 1.2 Water Quality Protection Volume Calculation

Studies have shown the 85$^{th}$ percentile storm event (i.e., the storm event that is greater than 85% of the storms that occur) is a reasonable target event to address the vast majority of smaller, pollutant-loaded storms. Based on a rainfall analysis, 1.5 inches of rainfall has been identified as the average depth corresponding to the 85$^{th}$ percentile storm for the NCTCOG region. The runoff from these 1.5 inches of rainfall is referred to as the Water Quality Protection Volume ($WQ_v$). Thus, a stormwater management system designed for the $WQ_v$ will treat the runoff from all storm events of 1.5 inches or less, as well as a portion of the runoff for all larger storm events. The $WQ_v$ should not be discharged in a period less than 24 hours. Detention times greater than 24 hours would be more effective. Procedures for computing the release rate are found in *Section 2.2 of the Hydraulics Technical Manual*.

The water quality protection volume is calculated by multiplying the 85$^{th}$ percentile annual rainfall event by the volumetric runoff coefficient ($R_v$) and the site area. $R_v$ is defined as:

$$\mathbf{R_v = 0.05 + 0.009(I)} \qquad \mathbf{(1.1)}$$

where:

I = percent of impervious cover (%)

For North Central Texas, the average 85$^{th}$ percentile annual rainfall event is 1.5 inches. Therefore, $WQ_v$ is calculated using the following formula:

$$\mathbf{WQ_v = \frac{1.5\ R_v\ A}{12}} \qquad \mathbf{(1.2)}$$

where:

$WQ_v$ = water quality protection volume (acre-feet)

$R_v$ = volumetric runoff coefficient

A = total drainage area (acres)

$WQ_v$ can be expressed in inches ($Q_{wv}$) using the following formula:

$$\mathbf{Q_{wv} = 1.5(R_v)} \qquad \mathbf{(1.3)}$$

where:

$Q_{wv}$ = water quality protection volume (inches)

Determining the Water Quality Protection Volume ($WQ_v$)

- *Measuring Impervious Area*: The area of impervious cover can be taken directly off a set of plans or appropriate mapping. Where this is impractical, NRCS TR-55 land use/impervious cover relationships

can be used to estimate impervious cover. I is expressed as a percent value not a fraction (e.g., I = 30 for 30% impervious cover)

- *Multiple Drainage Areas*: When a development project contains or is divided into multiple outfalls, $WQ_v$ should be calculated and addressed separately for each outfall.
- *Water Quality Volume Reduction*: The use of certain *integrated* site design practices may allow the $WQ_v$ to be reduced. These volume reduction methods are described in *Section 1.3*.
- *Determining the Peak Discharge for the Water Quality Storm:* When designing off-line structural control facilities, the peak discharge of the water quality storm ($Q_{wq}$) can be determined using the method provided in *Section 1.4*.
- *Extended Detention of the Water Quality Volume:* The water quality treatment requirement can be met by providing a 24-hour drawdown of a portion of $WQ_v$ in a stormwater pond or wetland system (as described in *Section 1.0 of the Site Development Controls Technical Manual*). Referred to as water quality ED (extended detention), it is different than providing extended detention of the 1-year storm for the streambank protection volume ($SP_v$). The ED portion of the $WQ_v$ may be included when routing the $SP_v$.
- *Permanent Pool:* Wet ponds and wetlands will have permanent pools, the volume of which may be used to account for up to 50% of the $WQ_v$.
- $WQ_v$ can be expressed in cubic feet by multiplying by 43,560. $WQ_v$ can also be expressed in watershed-inches by removing the area (A) and the "12" in the denominator.

This approach to control pollution from stormwater runoff treats the $WQ_v$ from a site to reduce a target percentage of post-development total suspended solids (TSS). TSS was chosen as the representative stormwater pollutant for measuring treatment effectiveness for several reasons:

- The measurement standard of using TSS as an "indicator" pollutant is well established.
- Suspended sediment and turbidity, as well as other pollutants of concern adhere to suspended solids, and are a major source of water quality impairment due to urban development in the region's watersheds.
- A large fraction of many other pollutants of concern are removed either along with TSS, or at rates proportional to the TSS removal.

Even though TSS is a good indicator for many stormwater pollutants, there are special cases that warrant further consideration including:

- The removal performance for pollutants that are soluble or that cannot be removed by settling must be specifically designed for. For pollutants of specific concern, individual analyses of specific pollutant sources should be performed and the appropriate removal mechanisms implemented.
- Runoff, which is atypical in terms of normal TSS concentrations, will be treated to a higher or lesser degree. For example, treatment of highly turbid waters would attain a higher removal percentage but still may not attain acceptable water quality without additional controls or a higher level of BMP maintenance.
- Bed and bank-material sediment loads not accurately measured by the TSS standard are also typically removed using this approach.
- Site, stream, or watershed specific criteria, different from the TSS standard, may be developed through a state or federal regulatory program necessitating a tailored approach to pollution prevention.

## 1.3 Water Quality Protection Volume Reduction Methods

A set of stormwater "volume reduction methods" is presented to provide developers and site designers an incentive to implement site designs that can reduce the volume of stormwater runoff and minimize the pollutant loads from a site. The reduction directly translates into cost savings to the developer by reducing the size of structural stormwater control and conveyance facilities.

The basic premise of the system is to recognize the water quality benefits of certain site design practices by allowing for a reduction in the water quality protection volume ($WQ_v$). If a developer incorporates one or more of the methods in the design of the site, the requirement for capture and treatment of the water quality protection volume will be reduced.

The methods by which the water quality volume can be reduced are listed in Table 1.1. Site-specific conditions will determine the applicability of each method. For example, the stream buffer reduction cannot be taken on upland sites that do not contain perennial or intermittent streams. Perennial streams flow 365 days a year in a normal year. Intermittent streams have short or lengthy periods of time when there is no flow in a normal year.

**Table 1.1 Methods to Reduce the Water Quality Volume**

| Practice | Description |
|---|---|
| Natural area conservation | Undisturbed natural areas are conserved on a site, thereby retaining their pre-development hydrologic and water quality characteristics. |
| Stream buffers | Stormwater runoff is treated by directing sheet flow runoff through a naturally vegetated or forested buffer as overland flow. |
| Use of vegetated channels | Vegetated channels are used to provide stormwater treatment. |
| Overland flow filtration/infiltration zones | Overland flow filtration/infiltration zones are incorporated into the site design to receive runoff from rooftops and other small impervious areas. |
| Environmentally sensitive large lot subdivisions | A group of site design techniques are applied to low and very low density residential development. |

Site designers are encouraged to use as many volume reduction methods as they can on a site. Greater reductions in stormwater storage volumes can be achieved when many methods are combined (e.g., disconnecting rooftops and protecting natural conservation areas). However, volume reduction cannot be claimed twice for an identical area of the site (e.g. claiming a reduction for stream buffers and disconnecting rooftops over the same site area).

Due to local safety codes, soil conditions, and topography, some of these volume reduction methods may be restricted. Designers are encouraged to consult with the appropriate approval authority to ensure if and when a reduction is applicable and to determine restrictions on non-structural strategies.

The methods by which the water quality volume can be reduced are detailed below. For each volume reduction method, there is a minimum set of criteria and requirements that identify the conditions or circumstances under which the reduction may be applied. The intent of the suggested numeric conditions (e.g., flow length, contributing area, etc.) is to avoid situations that could lead to a volume reduction being

granted without the corresponding reduction in pollution attributable to an effective site design modification.

Volume Reduction Method #1: Natural Area Conservation

A water quality volume reduction can be taken when undisturbed natural areas are conserved on a site, thereby retaining their pre-development hydrologic and water quality characteristics. Under this method, a designer would be able to subtract the conservation areas from the total site area when computing the water quality protection volume. An added benefit is that the post-development peak discharges will be smaller, and hence, water quantity control volumes will be reduced due to lower post-development curve numbers or rational formula "C" values.

**Rule: Subtract conservation areas from total site area when computing water quality protection volume requirements.**

Criteria:

- Conservation area cannot be disturbed during project construction and must be protected from sediment deposition.
- Shall be protected by limits of disturbance clearly shown on all construction drawings
- Shall be located within an acceptable conservation easement instrument that ensures perpetual protection of the proposed area. The easement must clearly specify how the natural area vegetation shall be managed and boundaries will be marked [Note: managed turf (e.g., playgrounds, regularly maintained open areas) is not an acceptable form of vegetation management]
- Shall have a minimum contiguous area requirement of 10,000 square feet
- $R_v$ is kept constant when calculating $WQ_v$
- Must be forested or have a stable, natural ground cover.

**Example:**

Residential Subdivision
Area = 38 acres
Natural Conservation Area = 7 acres
Impervious Area = 13.8 acres

$R_v = 0.05 + 0.009 (I) = 0.05 + 0.009 (36.3\%) = 0.38$

*Reduction*:

7.0 acres in natural conservation area

New drainage area = 38 – 7 = 31 acres

*Before reduction*:
**$WQ_v = (1.5)(0.38)(38)/12 = 1.81$ ac-ft**

*With reduction*:
**$WQ_v = (1.5)(0.38)(31)/12 = 1.47$ ac-ft**

(19% reduction in water quality protection volume)

Volume Reduction Method #2: Stream Buffers

This reduction can be taken when a stream buffer effectively treats stormwater runoff. Effective treatment constitutes treating runoff through overland flow in a naturally vegetated or forested buffer. Under the proposed method, a designer would be able to subtract areas draining via overland flow to the buffer from total site area when computing water quality protection volume requirements. In addition, the volume of runoff draining to the buffer can be subtracted from the streambank protection volume. The design of the stream buffer treatment system must use appropriate methods for conveying flows above the annual recurrence (1-yr storm) event.

**Rule: Subtract areas draining via overland flow to the buffer from total site area when computing water quality protection volume requirements.**

Criteria:

- The minimum undisturbed buffer width shall be 50 feet
- The maximum contributing length shall be 150 feet for pervious surfaces and 75 feet for impervious surfaces
- The average contributing slope shall be 3% maximum unless a flow spreader is used
- Runoff shall enter the buffer as overland sheet flow. A flow spreader can be installed to ensure this
- Buffers shall remain as naturally vegetated or forested areas and will require only routine debris removal or erosion repairs
- $R_v$ is kept constant when calculating $WQ_v$
- Not applicable if overland flow filtration/groundwater recharge reduction is already being taken

**Example:**

Residential Subdivision
Area = 38 acres
Impervious Area = 13.8 acres
Area Draining to Buffer = 5 acres

$R_v = 0.05 + 0.009\ (I) = 0.05 + 0.009\ (36.3\%) = 0.38$

*Reduction*:

5.0 acres draining to buffer

New drainage area = 38 – 5 = 33 acres

*Before reduction*:
**$WQ_v = (1.5)(0.38)(38)/12 = 1.81$ ac-ft**

*With reduction*:
**$WQ_v = (1.5)(0.38)(33)/12 = 1.57$ ac-ft**

(13% reduction in water quality protection volume)

Volume Reduction Method #3: Enhanced Swales

This reduction may be taken when enhanced swales are used for water quality protection. Under the proposed method, a designer would be able to subtract the areas draining to an enhanced swale from total site area when computing water quality protection volume requirements. An enhanced swale can fully meet the water quality protection volume requirements for certain kinds of low-density residential development (see Volume Reduction Method #5). An added benefit is the post-development peak discharges will likely be lower due to a longer time of concentration for the site.

**Rule: Subtract the areas draining to an enhanced swale from total site area when computing water quality protection volume requirements.**

Criteria:

- This method is typically only applicable to moderate or low density residential land uses (3 dwelling units per acre maximum)
- The maximum flow velocity for water quality design storm shall be less than or equal to 1.0 feet per second
- The minimum residence time for the water quality storm shall be 5 minutes
- The bottom width shall be a maximum of 6 feet. If a larger channel is needed use of a compound cross section is required
- The side slopes shall be 3:1 (horizontal:vertical) or flatter
- The channel slope shall be 3 percent or less
- $R_v$ is kept constant when calculating $WQ_v$

**Example:**

Residential Subdivision
Area = 38 acres
Impervious Area = 13.8 acres

$R_v = 0.05 + 0.009\ (I) = 0.05 + 0.009\ (36.3\%) = 0.38$

*Reduction*:

12.5 acres meet enhanced swale criteria

New drainage area = 38 – 12.5 = 25.5 acres

*Before reduction*:
**$WQ_v = (1.5)(0.38)(38)/12 = 1.81$ ac-ft**

*With reduction*:
**$WQ_v = (1.5)(0.38)(25.5)/12 = 1.21$ ac-ft**

(33% reduction in water quality protection volume)

Volume Reduction Method #4: Overland Flow Filtration/Groundwater Recharge Zones

This reduction can be taken when "overland flow filtration/infiltration zones" are incorporated into the site design to receive runoff from rooftops or other small impervious areas (e.g., driveways, small parking lots, etc). This can be achieved by grading the site to promote overland vegetative filtering or by providing infiltration or "rain garden" areas. If impervious areas are adequately disconnected, they can be deducted from total site area when computing the water quality protection volume requirements. An added benefit will be that the post-development peak discharges will likely be lower due to a longer time of concentration for the site.

**Rule: If impervious areas are adequately disconnected, they can be deducted from total site area when computing the water quality protection volume requirements.**

Criteria:

- Relatively permeable soils (hydrologic soil groups A and B) should be present
- Runoff shall not come from a designated hotspot
- The maximum contributing impervious flow path length shall be 75 feet
- Downspouts shall be at least 10 feet away from the nearest impervious surface to discourage "re-connections"
- The disconnection shall drain continuously through a vegetated channel, swale, or filter strip to the property line or structural stormwater control
- The length of the "disconnection" shall be equal to or greater than the contributing length
- The entire vegetative "disconnection" shall be on a slope less than or equal to 3 percent
- The surface imperviousness area to any one discharge location shall not exceed 5,000 square feet
- For those areas draining directly to a buffer, reduction can be obtained from either overland flow filtration -*or*- stream buffers (See Method #2)
- $R_v$ is kept constant when calculating $WQ_v$

**Example:**

Site Area = 3.0 acres
Impervious Area = 1.9 acres (or 63.3% impervious cover)
"Disconnected" Impervious Area = 0.5 acres

$R_v = 0.05 + 0.009\ (I) = 0.05 + 0.009\ (63.3\%) = 0.62$

*Reduction*:

0.5 acres of surface imperviousness hydrologically disconnected

New drainage area = 3 – 0.5 = 2.5 acres

*Before reduction*:
**$WQ_v = (1.5)(0.62)(3)/12 = 0.23$ ac-ft**

*With reduction*:
**$WQ_v = (1.5)(0.62)(2.5)/12 = 0.19$ ac-ft**

(17% reduction in water quality protection volume)

Volume Reduction Method #5: Environmentally Sensitive Large Lot Subdivisions

This reduction can be taken when a group of environmental site design techniques are applied to low and very low density residential development (e.g., 1 dwelling unit per 2 acres [du/ac] or lower). The use of this method can eliminate the need for structural stormwater controls to treat water quality protection volume requirements. This method is targeted towards large lot subdivisions and will likely have limited application.

**Rule: Targeted towards large lot subdivisions (e.g. 2 acre lots and greater). The requirement for structural practices to treat the water quality protection volume shall be waived.**

Criteria:

*For Single Lot Development:*

- Total site impervious cover is less than 15%
- Lot size shall be at least two acres
- Rooftop runoff is disconnected in accordance with the criteria in Method #4
- Grass channels are used to convey runoff versus curb and gutter

*For Multiple Lots:*

- Total impervious cover footprint shall be less than 15% of the area
- Lot areas should be at least 2 acres, unless clustering is implemented. Open space developments should have a minimum of 25% of the site protected as natural conservation areas and shall be at least a half-acre average individual lot size
- Grass channels should be used to convey runoff versus curb and gutter (see Method #3)
- Overland flow filtration/infiltration zones should be established (see Method #4)

## 1.4 Water Quality Protection Volume Peak Flow Calculation

The peak rate of discharge for the water quality design storm is needed for the sizing of off-line diversion structures, such as for sand filters and infiltration trenches. An arbitrary storm would need to be chosen using the Rational Method, as conventional SCS methods have been found to underestimate the volume and rate of runoff for rainfall events less than 2 inches. This discrepancy in estimating runoff and discharge rates can lead to situations where a significant amount of runoff by-passes the treatment practice due to an inadequately sized diversion structure and leads to the design of undersized bypass channels.

The following procedure can be used to estimate peak discharges for small storm events. It relies on the Water Quality Protection Volume and the simplified peak flow estimating method above. A brief description of the calculation procedure is presented below.

(Step 1) Using $Q_{wv}$ and *Equation 1.8 of the Hydrology Technical Manual*, a corresponding Curve Number (CN) is computed utilizing the following equation:

$$\mathbf{CN = 1000/[10 + 5P + 10Q_{wv} - 10(Q_{wv}^2 + 1.25\ Q_{wv}P)^{½}]}$$

where:

P = Rainfall, in inches (use 1.5 inches for the iSWM Water Quality Storm)
$Q_{wv}$ = Water Quality Protection Volume, in inches ($1.5R_v$)

(Step 2) Once a CN is computed, the time of concentration ($t_c$) is computed (based on the methods described in this section).

(Step 3) Using the computed CN, $t_c$ and drainage area (A), in acres; the peak discharge ($Q_{wq}$) for the water quality storm event is computed using a slight modification of the Simplified SCS Peak Runoff Rate Estimation technique of *Section 1.3 of the Hydrology Technical Manual*. Use Type II rainfall distribution for North Central Texas.

(Step 4) Read initial abstraction ($I_a$) from *Table 1.11 of the Hydrology Technical Manual*, compute $I_a/P$

(Step 5) Read the unit peak discharge ($q_u$) from *Figure 1.10 of the Hydrology Technical Manual*, for appropriate tc

- Using $Q_{wv}$, compute the peak discharge ($Q_{wq}$)

$$\mathbf{Q_{wq} = q_u * A * Q_{wv}}$$

where:

$Q_{wq}$ = the water quality peak discharge (cfs)
$q_u$ = the unit peak discharge (cfs/mi²/inch)
A = drainage area (mi²)
$Q_{wv}$ = Water Quality Protection Volume, in inches ($1.5R_v$)

## Example Problem

Using the data and information from the example problem in *Section 1.3.8 of the Hydrology Technical Manual* calculates the water quality volume and the water quality peak flow.

Calculate water quality protection volume ($Q_{wv}$)

Compute volumetric runoff coefficient, $R_v$

$R_V = 0.05 + (0.009)(I) = 0.05 + (0.009)(18/50 \times 100\%) = 0.37$

Compute water quality protection volume, $Q_{wv}$

$Q_{wv} = 1.5(R_V)(A)/12 = 1.5(.37)(50)/12 = 2.31$ acre-feet

Calculate water quality peak flow

Compute runoff volume in inches, $Q_{wv}$, where P = 1.5 inches:

$Q_{wv} = 1.5\ R_v = 1.5 * 0.37 = 0.56$ inches

Compute curve number:

$CN = 1000/[10 + 5P + 10Q_{wv} - 10(Q_{wv}^2 + 1.25\ Q_{wv}\ P)^{½}]$
$CN = 1000/[10 + 5*1.5 + 10*0.56 - 10(0.56^2 + 1.25*0.56*1.5)^{½}]$
$= 88$
$t_c = 0.35$ (computed previously)

$S = 1000/CN – 10 = 1000/84 – 10 = 1.36$ inches
$0.2S = I_a = 0.27$ inches
$I_a/P = 0.27/1.5 = 0.18$

Find $q_u$:

From *Figure 1.10 of the Hydrology Technical Manual* for $I_a/P = 0.18$ $q_u = 580$ cfs/mi²/in

Compute water quality peak flow:

$Q_{wq} = q_u * A * Q_{wv} = 580 * 50/640 * 0.56 = 25.4$ cfs

# 2.0 Construction SWPPP Guidelines and Form

## 2.1 State Requirements

The Texas Commission on Environmental Quality (TCEQ) issues TPDES General Permit No. TXR150000 Relating to Discharges Associated with Construction Activities, otherwise known as the TPDES Construction General Permit. The permit is typically effective for a five year period. At each five year renewal of the permit, the TCEQ reviews the permit requirements and makes changes as they deemed necessary. Changes may be based on the TCEQ's experience during the past five year period or may be in response to new criteria from the Environmental Protection Agency (EPA). The current TPDES Construction General Permit can be found at:
www.tceq.state.tx.us/assets/public/permitting/waterquality/attachments/stormwater/txr150000.pdf

The TPDES Construction General Permit requires a Storm Water Pollution Prevention Plan (SWPPP or SWPPP) for construction activity that:

- Disturbs one acre or more of land; or
- Disturbs less than one acre of land and is part of a common plan of development that disturbs one acre or more of land.

Requirements for the SWPPP are in Part III of the TPDES Construction General Permit. Currently, the TCEQ does not provide guidance on preparing a SWPPP. EPA provides SWPPP guidance, templates and examples at: http://cfpub.epa.gov/npdes/stormwater/swppp.cfm#guide

## 2.2 Disclaimer

The Construction SWPPP Guidelines presented in this section of the iSWM Technical Manual were developed for the 2003 TPDES Construction General Permit which expired in 2008. Some of the content in these guidelines does not reflect SWPPP requirements in the current permit. In addition, the EPA published a Final Rule for Effluent Limitations Guidelines and Standards for the Construction and Development Point Source Category on December 1, 2009. This rule will significantly alter the SWPPP requirements for construction activities as it is phased into effect over the next few years. The North Central Texas Council of Governments is in the process of reviewing the new rule and determining how these guidelines should be revised.

The basic methodology of the SWPPP design and implementation presented in these guidelines is still sound. Users of the iSWM Technical Manual may use the guidelines to develop a SWPPP. However, they must separately ensure compliance with the SWPPP requirements in the current TPDES Construction General Permit.

The North Central Texas Council of Governments or local municipalities make no claim regarding the conformity of the information presented in these guidelines with state or federal regulations. Use of the information and/or SWPPP Narrative form does not in any way guarantee that the user will be in compliance with the TPDES Construction General Permit. The North Central Texas Council of Governments or local municipalities assume no liability for prosecution arising out of the use of the information and/or SWPPP Narrative form.

For projects requiring permit coverage, the Storm Water Pollution Prevention Plan should be checked thoroughly for compliance with current TPDES Construction General Permit.

## 2.3 Overview

The Storm Water Pollution Prevention Plan (SWPPP) is the primary tool for reducing erosion and preventing sediment loss from a construction site and the developed property once the building is placed in service. It consists of a narrative and drawings of the existing conditions and control methods to be employed during the land disturbance and construction process. Storm Water Pollution Prevention Plans shall be prepared in accordance with good engineering practices and prepared by someone with a background in hydrology or hydraulics and familiar with sediment and erosion control. It is recommended that a Certified Professional in Erosion and Sediment Control (CPESC) or qualified engineer or landscape architect prepare the SWPPP. Note that there are a few MS4 municipalities in North Central Texas that require the SWPPP to be prepared by a registered Professional Engineer.

These guidelines incorporate the design elements of the iSWM Criteria Manual along with the general provisions of the TPDES Construction General Permit. The iSWM Technical Manual includes a form for use as a model in developing the narrative portion of a SWPPP.

Note: A few local governments in North Central Texas require the Construction SWPPP to meet a numeric design guideline (site rating) for erosion minimization and sediment retention on construction sites. The Construction Controls section of the iSWM Technical Manual contains methodology for the Site Rating Calculation.

## 2.4 Elements of a Construction SWPPP

An adequate Construction SWPPP includes a narrative and drawings. The narrative is a written statement to explain and justify the pollution prevention decisions made for a particular project. The narrative contains concise information about existing site conditions, construction schedules, and other pertinent items that may not be contained on the drawings. The drawings and notes describe where and when the various controls should be installed, the performance the controls are expected to achieve, and actions to be taken if the performance goals are not achieved.

### *2.4.1 Narrative*

Project description: Describe the nature and purpose of the construction activity. Include the size (in acres) of the entire property and the area to be disturbed by project construction, including off-site material storage areas, overburden and stockpiles of dirt, and borrow areas.

Existing topography and natural drainage features: Describe the existing topography, drainage patterns, and natural drainage features on the site including channels, creeks, watercourses, etc. Provide name (if available) of creeks, streams, etc. and protection measures such as buffers. Provide the name of receiving waters.

Existing storm sewer system: Describe existing onsite storm sewer systems including location of inlets and outfalls, pipe sizes, etc. Provide a description of the downstream drainage facilities leading from the site to the receiving body of water.

Soils: Describe the soil on the site, giving such information as the soil type(s) and erodibility (low, medium, high or an index value from the county Natural Resource Conservation Service (NRCS) soil survey. Identify any unique site characteristics that may not be shown on the soil survey based upon a field visit.

Ground cover: Label existing vegetation on the drawing. Such features as tree clusters, grassy areas, and unique or sensitive vegetation should be shown.

Critical areas: Describe the location, size, and characteristics of any wetlands, streams, or lakes that are within the site, and/or will receive discharges from disturbed areas of the project, and protection

measures. Note areas with high erosion potential including steep slopes and flood hazard areas. Describe special requirements for working near or within any of these areas.

Potential pollutants: Describe potential pollutants, including construction and waste materials, chemicals, paints, solvents, fuels, etc expected to be stored on-site and controls to minimize pollutant discharges.

Construction support activities: Describe any on-site or off-site asphalt or concrete batch plants, equipment staging, repair, or refueling areas, and material storage areas providing sole and direct support to the construction project and controls that will be implemented to minimize pollutant discharges.

Construction schedule: Describe the intended schedule or sequence of major activities that will disturb soils for major portions of the site. Describe the general timing or sequence for implementation (and removal) of BMPs that will be used to minimize pollution in runoff. Describe the average monthly rainfall and rainfall intensity for required design storm events during the anticipated schedule.

Engineering calculations: Attach any calculations made for the design of such items as sediment basins and temporary swales, dikes, and channels. For sediment basins, engineering calculations must bear the signature and stamp of an engineer licensed in the state of Texas.

Elements of a Construction SWPPP: Describe how the Construction SWPPP addresses each of the following elements of a Construction SWPPP. Include the type and location of controls used to satisfy the required element and the general timing or sequence for implementation. If one or more of the elements are not applicable to a project, provide a written justification for why the particular element(s) is (are) not necessary. Refer to *Section 4.3 of the Criteria Manual* for additional details on the elements.

1. Limits of Disturbance - Description of the areas including natural drainage features, trees and other vegetation, and appropriate buffers that are to be preserved within the construction area and the measures to be implemented to ensure protection.
2. Stabilization to Prevent Soil Erosion - Description of the temporary and final stabilization practices for disturbed areas of the site, including a schedule of when the practices will be implemented.
3. Slope Protection - Description of the practices used to protect slopes and divert flows away from exposed soils or disturbed areas.
4. Sediment Barriers and Perimeter Controls - Description of the practices to lessen the off-site transport of sediment and to reduce generation of dust. Sediment basins are required, where feasible, for common drainage locations that serve an area with ten or more acres disturbed at one time.
5. Velocity Dissipation and Channel Protection - Description of velocity dissipation devices used at discharge locations and channel stabilization measures to provide non-erosive flows.
6. Construction Access Controls - Description of measures to minimize the off-site tracking of sediment by vehicles.
7. Storm Drain Inlet Protection - Description of inlet protection measures to prevent sediment from entering the storm drain system.
8. Dewatering Controls - Description of controls to prevent the off-site transport of suspended sediments and other pollutants in discharges from dewatering operations.
9. Material and Waste Controls - Description of controls to reduce pollutants and spill prevention and response procedures associated with construction and waste materials. Description of controls and measures that will be implemented to minimize pollutants in any discharges associated with industrial activity other than construction (i.e., dedicated asphalt or concrete plants).
10. Construction Phasing and Project Management Description of considerations given to project phasing in order to reduce the amount of soil exposed at one time.

Permanent Storm Water Controls: Describe any measures that will be installed during the construction process to control pollutants in discharges from the site after construction operations have been completed.

Copy of the TPDES Construction General Permit: Include a copy of TPDES Construction General Permit TXR 150000 with the SWPPP. Also include a copy of the Notice(s) of Intent for large construction activities or the Construction Site Notice(s) for large and small construction activities as part of the SWPPP.

### 2.4.2 Drawings

Vicinity map: Provide a map providing the general location of the site in relation to the surrounding area and roads.

Site map: Provide one or more plan sheets drawn to scale showing the following features. The site map requirements may be met using multiple plan sheets for ease of legibility.

- Location of property boundaries.
- The direction of north in relation to the site and scale of the drawing.
- Existing structures and roads, if present.
- Identification of and approximate boundaries for existing soil types.
- Existing topography (maximum 2' contour interval) with at least two contour elevations labeled on each plan sheet.
- Limits of on-site surface waters and adjacent critical areas (including wetlands), their buffers, and FEMA base flood boundaries.
- Limits of drainage subbasins and the direction of flow for the different drainage areas (before and after major grading activities).
- Drainage features such as drainage systems, channels, and natural watercourses.
- Surface waters, including wetlands, adjacent or in close proximity to the site.
- Locations where storm water runoff discharges from the site directly to a surface water body.
- Boundaries of areas where soil disturbance will occur (clearing and grading limits).
- Final grade contours (maximum 2' contour interval) with at least two contour elevations labeled on each plan sheet and approximate slopes indicated.
- Existing vegetation and the vegetation that is to be preserved.
- Limits and time frame of construction phases.
- Approximate slope and cut and fill slopes indicating top and bottom of slope catch lines for grades exceeding 5%.
- Locations of on-site or off-site waste, chemical, fuel, and equipment storage, fueling, or maintenance areas.
- Locations of on-site or off-site material, waste, borrow or fill areas.
- Locations of any asphalt or concrete batch plants providing sole and direct support to the construction site.

Conveyance systems: Show on the site map the following temporary and permanent conveyance features.

- Channels associated with erosion and sediment control and storm water management.

- Locations of temporary and permanent storm drain pipes.
- Slope, dimensions, and direction of flow in swales, dikes, channels, culverts, and pipes.
- Locations and outlets of any dewatering systems.

Erosion and Sediment Controls: Show on the site map the locations for all of the controls described for the elements in the narrative portion of the SWPPP. The controls must satisfy each of the elements of a Construction SWPPP, unless justification is provided in the narrative for not including one or more of the elements. Show construction details and specifications for the controls. Some examples of controls include (but are not limited to):

- Locations of interceptor swales or diversion dikes and details for bypassing off-site runoff around disturbed areas.
- The location of sediment basin(s) and appropriate details including overall dimensions, storage volume, inflow and release rates, riser barrel/outlet assembly, overflow, embankment, etc.
- Flow depth and velocity for proposed swales and channels and other measures to control flow rates and stabilize channels.
- Locations and details for inlet and outlet protection practices.
- Locations and details for mulch and/or recommended cover of slopes.
- Locations and details for temporary or final vegetation (stabilization practices).
- Locations and details for check dams.
- Locations and details for organic filter berms, silt fence, organic filter tubes, or triangular sediment dikes.
- Locations of passive or active treatment systems.
- The construction entrance location and details.
- Any permanent (post-construction) storm water management controls to be installed during the construction phase.
- Locations of controls for pollutants from construction support activities.
- Location of controls for pollutants other than sediment.

Detailed drawings: Any structural practices used that are not referenced in this manual or other local manuals should be explained and illustrated with detailed drawings.

## 2.5 SWPPP Review Checklist

A checklist is provided for local municipalities to use in reviewing Storm Water Pollution Prevention Plans for conformance with the provisions of this Manual. The checklist is also useful for SWPPP designers to check the contents of the SWPPP.

# Storm Water Pollution Prevention Plan Review Checklist

Project Name_____

Location/Address _____

Operator's Name _____ Operator's Phone No. _____

Preparer's Name _____ Preparer's Phone No. _____

Reviewer _____ Date _____

## I. NARRATIVE

_____ Project Title

_____ Operator with Control Over Construction Plans and Specifications

- _____ Company Name and Address
- _____ Name and Phone Number of Operator's Representative
- _____ Name of Preparer and Date Prepared
- _____ Certification Statement in accordance with TPDES Construction General Permit TXR150000
- _____ Signatory Name and Title (printed) and Signature

_____ Operator(s) with Day-to-Day Operational Control Over Activities to Ensure Compliance with SWPPP

- _____ Company Name(s) and Address(es)
- _____ Name and Phone Number of Operator's Representative

_____ Copy of NOI(s) or Site Notice(s) and TPDES Construction General Permit TXR150000

_____ Name of Receiving Water(s)

_____ Name of Municipal Separate Storm Sewer System (MS4) Receiving Discharge (if applicable)

_____ Description of Project/Construction Activity

_____ Total Area of Property

_____ Total Area of Site to be Disturbed by Project Construction

_____ Total Area of Off-site Material Storage Areas, Overburden & Stockpiles of Dirt, and Borrow Areas

_____ Description of Existing Topography and Natural Drainage Features (pre-construction drainage patterns, and natural drainage features including channels, creeks, watercourses, etc.)

_____ Description of Existing Storm Sewer System (existing onsite storm sewer systems including location of inlets and outfalls, pipe sizes, etc.)

_____ Description of Soils (i.e., soil types, erodibility, unique site soil features, etc.)

_____ Description of Existing/Pre-construction Ground Cover (i.e.tree clusters, grassy areas, and unique or sensitive vegetation)

_____ Description of Critical Areas (location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project; steep slopes and areas with high erosion potential)

_____ Description of Potential Pollutants (i.e.,construction and waste materials, chemicals, paints, solvents, etc expected to be stored on-site)

_____ Construction Support Activities (on-site or off-site asphalt or concrete batch plants, equipment staging, repair, or refueling areas, and material storage areas providing sole and direct support to the construction project and controls that will be implemented to minimize pollutant discharges)

_____ Sequence of Major Construction Activities (intended sequence of major activities that will disturb soils and general timing or sequence for implementation (and removal) of controls )

_____ Description of Permanent/Post-Construction Storm Water Management Controls (measures that will be installed to control pollutants in storm water discharges that will occur after construction is complete and the developed property is placed in service)

_____ Engineering Calculations (review calculations made for the design of such items as sediment basins and temporary swales, dikes, and channels. For sediment basins, engineering calculations must bear the signature and stamp of an engineer licensed in the state of Texas)

**Elements of a Construction SWPPP**

For each of the following elements, evaluate the description of the measures used to address the element. Evaluate the type and location of controls used to satisfy the required element and the general timing or sequence for implementation. If an element is indicated as not applicable to a project, evaluate the written justification for why it is not necessary.

_____ 1. Limits of Disturbance - Description of the areas including natural drainage features, trees and other vegetation, and appropriate buffers that are to be preserved within the construction area and the measures to be implemented to ensure protection.

_____ 2. Stabilization to Prevent Soil Erosion - Description of the temporary and permanent stabilization practices for disturbed areas of the site, including a schedule of when the practices will be implemented.

_____ 3. Slope Protection - Description of the practices used to protect slopes and divert flows away from exposed soils or disturbed areas.

_____ 4. Sediment Barriers and Perimeter Controls - Description of the practices to lessen the off-site transport of sediment and to reduce generation of dust. Sediment basins are required, where feasible, for common drainage locations that serve an area with ten or more acres disturbed at one time.

_____ 5. Velocity Dissipation and Channel Protection - Description of velocity dissipation devices used at discharge locations and channel stabilization measures to provide non-erosive flows.

_____ 6. Construction Access Controls - Description of measures to minimize the off-site tracking of sediment by vehicles.

_____ 7. Storm Drain Inlet Protection - Description of inlet protection measures to prevent sediment from entering the storm drain system.

_____ 8. Dewatering Controls - Description of controls to prevent the off-site transport of suspended sediments and other pollutants in discharges from dewatering operations.

_____ 9. Material and Waste Controls - Description of controls to reduce pollutants and spill prevention and response procedures associated with construction and waste materials. Description of controls and measures that will be implemented to minimize pollutants in any discharges associated with industrial activity other than construction (i.e., dedicated asphalt or concrete plants).

_____ 10. Construction Phasing and Project Management - Description of considerations given to project phasing in order to reduce the amount of soil exposed at one time.

# II. DRAWINGS

_____ Vicinity map (providing the general location of the site in relation to the surrounding area and roads).

Site map: Verify that the plan sheets are drawn to scale and show the following features:

_____ Location of property boundaries

_____ The direction of north in relation to the site and scale of the drawing

_____ Existing structures and roads, if present

_____ Identification of and approximate boundaries for existing soil types

_____ Existing topography (maximum 2' contour interval) with at least two contour elevations labeled on each plan sheet

_____ Limits of on-site surface waters and adjacent critical areas (including wetlands), their buffers, and FEMA base flood boundaries

_____ Limits of drainage subbasins and the direction of flow for the different drainage areas (before and after major grading activities)

_____ Drainage features such as drainage systems, channels, and natural watercourses

_____ Surface waters, including wetlands, adjacent or in close proximity to the site

_____ Locations where storm water runoff discharges from the site directly to a surface water body

_____ Boundaries of areas where soil disturbance will occur (clearing and grading limits)

_____ Final grade contours (maximum 2' contour interval) with at least two contour elevations labeled on each plan sheet and approximate slopes indicated

_____ Existing vegetation and the vegetation that is to be preserved

_____ Limits and time frame of construction phases

_____ Approximate slope and cut and fill slopes indicating top and bottom of slope catch lines for grades exceeding 5%

_____ Locations of on-site or off-site waste, chemical, fuel, and equipment storage, fueling, or maintenance areas

_____ Locations of on-site or off-site material, waste, borrow or fill areas

_____ Locations of any asphalt or concrete batch plants providing sole and direct support to the construction site

Conveyance systems: Show on the site map the following temporary and permanent conveyance features.

_____ Channels associated with erosion and sediment control and storm water management

_____ Locations of temporary and permanent storm drain pipes

_____ Slope, dimensions, and direction of flow in swales, dikes, channels, culverts, and pipes

_____ Locations and outlets of any dewatering systems

Erosion and Sediment Controls: Check the site map for the locations of all the controls described for the elements in the narrative portion of the SWPPP. Check for construction details and specifications for the controls. The controls must satisfy each of the elements of a Construction SWPPP, unless justification was provided in the narrative for not including one or more of the elements. Some examples of controls include (but are not limited to):

_____ Locations of interceptor swales or diversion dikes and details for bypassing off-site runoff around disturbed areas

_____ The location of sediment basin(s) and appropriate details including overall dimensions, storage volume, inflow and release rates, riser barrel/outlet assembly, overflow, embankment, etc.

_____ Flow depth and velocity for proposed swales and channels and BMPs to control flow rates and stabilize channels

_____ Locations and details for inlet and outlet protection practices

_____ Locations and details for mulch and/or recommended cover of slopes

_____ Locations and details for temporary or permanent vegetation (stabilization practices)

_____ Locations and details for check dams

_____ Locations and details for organic filter berms, silt fence, organic filter tubes, or triangular sediment dikes

_____ Locations of passive or active treatment systems

_____ Construction entrance location and details

_____ Any permanent (post-construction) storm water management controls to be installed during the construction phase

_____ Locations of controls for pollutants from construction support activities

_____ Location of controls for pollutants other than sediment

Detailed drawings: Any structural practices used that are not referenced in this manual or other local manuals should be explained and illustrated with detailed drawings.

# Corrective Actions Required

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## 2.6 SWPPP Form

# Storm Water Pollution Prevention Plan Narrative

| | |
|---|---|
| Project Title | |
| Operator with Control Over Construction Plans and Specifications (Company Name and Address) | |
| Operator's Representative | Phone No. |
| Prepared by | Date |
| I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. | |
| Signatory Name and Title | Signature |

**Operator with Day-to-Day Operational Control Over Activities to Ensure Compliance with SWPPP**

| | |
|---|---|
| Company Name and Address | |
| Operator's Representative | Phone No. |

**Revisions to SWPPP**

| Revision No. | Date | Description of Changes | Signature |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## DISCLAIMER

**The North Central Texas Council of Governments or local municipality make no claim regarding the conformity of this form with state or federal regulations. Use of this form does not in any way guarantee that the user will be in compliance with the TPDES Construction General Permit TXR150000. The North Central Texas Council of Governments or local government assume no liability for prosecution arising out of the use of the information and/or SWPPP Narrative form.**

**For projects requiring permit coverage, the Storm Water Pollution Prevention Plan must be checked thoroughly by the operator for compliance with TPDES Construction General Permit TXR150000.**

**Copy of NOI(s) or Site Notice(s) and TPDES General Permit TXR150000 attached?** ☐

**Name of Receiving Water(s)**_____

**Name of Municipal Separate Storm Sewer System (MS4) Receiving Discharge** (if applicable) _____

**Total Area of Property** _____ Acres

**Total Area of Site to be Disturbed** _____ Acres

**Total Area of Off-site Material Storage & Borrow/Fill Sites** _____ Acres

**Description of Project/Construction Activity**

_____

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## Sequence of Major Construction Activities

Provide a description of the intended sequence of major activities that will disturb soils. Describe the general timing or sequence for implementation (and removal) of controls that will be used to minimize pollution in runoff.

| Activity/BMP | Estimated Start | Estimated Completion |
|---|---|---|
| | | |
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| | | |

## Existing Topography and Drainage Features

Describe the existing topography, drainage patterns, and natural drainage features including channels, creeks, watercourses, etc. Provide name (if available) of creeks, streams, etc. and protection measures such as buffers.

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## Soil Types

| Soil Name | Erosion Factor (K) | Unified Classification | Site Coverage (%) |
|---|---|---|---|
| | | | |
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## Existing (Pre-construction) Ground Cover

Describe existing vegetation on the drawing. Such features as tree clusters, grassy areas, and unique or sensitive vegetation should be shown.

| Type of Grass/Vegetation/Trees | Approximate Density (%) | Site Coverage (%) |
|---|---|---|
| | | |
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## Critical Areas

Describe the location, size, and characteristics of any wetlands, streams, or lakes that are adjacent or in close proximity to the site, and/or will receive discharges from disturbed areas of the project. Also delineate areas with high erosion potential including steep slopes.

## Description of Potential Pollutants

Describe potential pollutants, including construction and waste materials, chemicals, paints, solvents, etc expected to be stored on-site.

## Existing Storm Sewer System

Describe any existing onsite storm sewer systems including location of inlets and outfalls, pipe sizes, etc.

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## Permanent (Post-Construction) Storm Water Management Controls

Provide a description of measures that will be installed to control pollutants (sediment, oil, grease, fertilizer, pesticides, etc.) in storm water discharges that will occur after construction is complete and the developed property is placed in service.

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## Elements of a Construction SWPPP

For each of the following elements, describe the measures used to address the element. Include the type and location of BMPs used to satisfy the required element and the general timing or sequence for implementation. If an element is not applicable to a project, provide a written justification for why it is not necessary.

## 1. Limits of Soil Disturbance

Provide a description of the areas including natural drainage features, trees and other vegetation, and appropriate buffers that are to be preserved within the construction area and the measures to be implemented to ensure protection.

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## 2. Stabilization to Prevent Soil Erosion

Describe the temporary and final stabilization practices for disturbed areas of the site, including a schedule of when the practices will be implemented.

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## 3. Slope Protection

Describe practices used to protect slopes and divert flows away from exposed soils or disturbed areas.

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## 4. Sediment Barriers and Perimeter Controls

Describe the practices to lessen the off-site transport of sediment and to reduce generation of dust. Sediment basins are required, where feasible, for common drainage locations that serve an area with ten or more acres disturbed at one time.

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## 5. Velocity Dissipation and Chanel Stabilization

Provide a description of velocity dissipation devices used at discharge locations and channel stabilization measures to provide non-erosive flows.

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## 6. Construction Access Controls

Provide a description of measures to minimize the off-site tracking of sediment by vehicles.

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## 7. Storm Drain Inlet Protection

Provide a description of inlet protection measures to prevent sediment from entering the storm drain system.

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## 8. Dewatering Controls

Provide a description of controls to prevent the off-site transport of suspended sediments and other pollutants in discharges from dewatering operations.

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## 9. Material and Waste Controls

Provide a description of controls to reduce pollutants and spill prevention and response procedures associated with construction and waste materials. Also provide a description of controls and measures that will be implemented to minimize pollutants in any discharges associated with industrial activity other than construction (i.e., dedicated asphalt or concrete plants) covered by the TPDES Construction General Permit.

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## 10. Construction Phasing and Project Management

Provide a description of considerations given to project phasing in order to reduce the amount of soil exposed at one time.

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