Post Construction Storm Water Control Requirements

The City of Richardson has implemented Post Construction Storm Water Controls as part of the Texas Pollutant Discharge Elimination System (TPDES) requirements.

The purpose of the policy is to require the treatment of storm water run-off on a development, or redevelopment site by the construction or installation of permanent post construction controls.

Developers are required to complete and incorporate into the civil plans the Graphical Peak Discharge Method Worksheet provided, and a Storm Water Quality Plan (SWQP) as detailed in the following.

Operation and maintenance of the installed or constructed post construction run-off controls will be the responsibility of the property owner.

Each proposed development site will be categorized in one of the following areas:

1) Greenfield Development
2) Infill Development
3) Non-Residential Less than One Acre Development

A SWQP will be required at the earliest stage of development for all sites. The SWQP will include, but not be limited to:

a) Site topography
b) Building and parking layout
c) Pervious/Impervious calculation
d) Potential structural controls

The purpose of the SWQP is to identify required Post Construction Storm Water Controls for development and incorporate them into the overall site planning and design process.

Developments likely to contribute identifiable pollutants or other chemicals of concern may be required to implement Best Management Practices that address specific concerns.

1) Greenfield Development

At the preliminary stages of development a SWQP must be submitted and approved.

The plan must demonstrate treatment of the first 1.5" of rainfall using the Water Quality Volume (WQV) calculation. If surface treatment cannot be achieved, then a Manufactured Treatment Device (MTD) that is designed to treat the first 1.5" of rainfall (70% TSS removal equivalent) may be used. The MTD must be sized by determining a water quality flow rate using the WQV calculation in conjunction with the Graphical Peak Discharge method.

This plan is to include but not be limited to:

- Site Topography
- Schematic Layout of Buildings, Parking, etc.
- Structural Control Location
- Pervious to Impervious ratio calculation
- WQV Calculation
- Water Quality Flow Rate calculation

2) Infill Development

At the preliminary stages of development a SWQP must be submitted and approved.

The plan must demonstrate treatment of the first 1.5" of rainfall using the Water Quality Volume (WQV) calculation. If surface treatment cannot be achieved, then a Manufactured Treatment Device (MTD) that is designed to treat the first 1.5" of rainfall (70% TSS removal equivalent) may be used. The MTD must be sized by determining a water quality flow rate using the WQV calculation in conjunction with the Graphical Peak Discharge method.

This plan is to include but not be limited to:

- Site topography
- Existing site plan
- Schematic layout of buildings, parking, etc.
- Structural control location
- Pervious to Impervious Ratio calculation
- WQV calculation
- Water Quality Flow Rate calculation

The WQV requirement may be reduced for developments that increase the amount of pervious area or implement the following practices:

- Natural Conservation Area
- Overland Flow Filtration/Groundwater Recharge Zones
- Use of Vegetated Channels

Any area contributing to one of these practices or pervious area that is added can be excluded from the WQV calculation.

For example:

- Existing Condition Total Area: 3 ac.
- Existing Pervious Total Area: 0.2 ac.
- Proposed Condition Pervious Area: 0.7 ac.
- Area to be considered in WQV equation: 3 ac. – (0.7 ac. – 0.2 ac.) = 2.5 ac.

Or

- Existing Condition Total Area: 3 ac.
- Natural Conservation Area/Filtration Area : 0.5 ac.
- Area to be considered in WQV equation: 3 ac. – 0.5 ac. = 2.5 ac.

3) Non-residential Less than 1 Acre

At the preliminary stages of development a SWQP must be submitted and approved.

This plan is to include but not be limited to:

- Site topography
- Schematic Layout of Buildings, Parking, etc.
- Structural Control Location
- Pervious to Impervious ratio calculation
- WQV calculation
- Water Quality Flow Rate calculation

For sites where the pervious area is being increased as a result of the proposed development, no Water Quality remediation is necessary unless the development is likely to contribute identifiable pollutants or chemicals of concern.

For sites where the pervious area is being decreased, the site will be considered Infill Development and must adhere to Infill Development Criteria.

Water Quality Volume Calculation*

WQv = Water Quality Volume (Ac.*ft)

Where:

$$WQv = \frac{1.5" * (Rv) * A}{12}$$

Rv = Volumetric Runoff Coefficient

A= Site Acreage (Ac.)

Volumetric Runoff Coefficient Calculation*

Rv = Volumetric Runoff Coefficient

Where:

$$Rv = 0.05 + 0.009 * (I)$$

I = Proposed Condition Impervious Cover
(Represented as numerical whole, i.e. 25, not 0.25 for 25%)

Water Quality Protection Volume Calculation*

Qwv = Water Quality Protection Volume (in.)

Where:

Qwv = 1.5" * (Rv)

Rv = Volumetric Runoff Coefficient

The control structure for the calculated Water Quality Volume should be designed to release the water over a 24 hour period.

*Water Quality Volume Calculation based on NCTCOG iSWM Manual

*Graphical Peak Discharge Method based on Urban Hydrology for Small Watersheds (TR-55)

Graphical Peak Discharge Method (TR-55)

Formulas Needed:

$$q_p = q_u A_m Q F_p \qquad \text{[eq. 4-1]}$$

where:

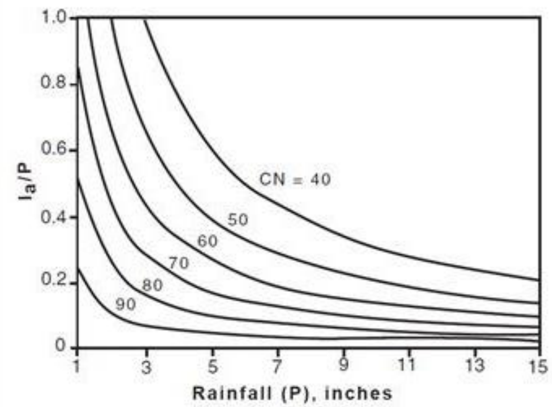
q_p = peak discharge (cfs)
q_u = unit peak discharge (csm/in)
A_m = drainage area (mi^2)
Q = runoff (in)
F_p = pond and swamp adjustment factor

$$\log(q_u) = C_o + C_1 \log(T_c) + C_2 \left[\log(T_c)\right]^2$$

where

q_u = unit peak discharge (csm/in)
T_c = time of concentration (hr)
(minimum, 0.1; maximum, 10.0)

Variation of Ia/P and CN:



Parameter	Variable	Value	Unit	Rainfall Type	Ia/P	Co	C1	C2
Drainage Area	Am		mi^2	II	0.10	2.55323	-0.61512	-0.16403
Curve Number	CN				0.30	2.46532	-0.62257	-0.11657
Rainfall	P	1.5	in		0.35	2.41896	-0.61594	-0.08820
Ia/P Ratio	Ia/P				0.40	2.36409	-0.59857	-0.05621
Time of Concentration	Tc		hr		0.45	2.29238	-0.57005	-0.02281
Rainfall Distribution			(II, III)		0.50	2.20282	-0.51599	-0.01259
C0				III	0.10	2.47317	-0.51848	-0.17083
C1					0.30	2.39628	-0.51202	-0.13245
C2					0.35	2.35477	-0.49735	-0.11985
Unit Peak Discharge	qu		csm/in		0.40	2.30726	-0.46541	-0.11094
Pond and Swamp Adjustment Factor	Fp	1			0.45	2.24876	-0.41314	-0.11508
Runoff (Water Quality Protection Volume Qwv)	Q		in		0.50	2.17772	-0.36803	-0.09525
Peak Discharge	qp		cfs					

Storm Water Quality Assessment Worksheet

RICHARDSON, TX
DEVELOPMENT SERVICES

Development Summary

Site: _____

Date: _____

Address: _____

Legal: _____

Development Type: _____ (G, I, >I)

Acreage: _____

Post Development Condition	**Pre Development Condition**
Impervious Area: _____	Impervious Area: _____
Impervious % _____	Impervious % _____

Water Quality Volume: _____

Water Quality Reduction (if applicable): _____

Water Quality Volume Required: _____

BMP's Considered for Use in Planning & Design: