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MEMORANDUM

DATE: April 21, 2021

TO: Mid Rio Grande Stormwater Quality Team

FROM: Sarah Ganley, PE

SUBJECT: **Review and Recommendations for Post-Construction Stormwater Quality Design Standards in the Middle Rio Grande Watershed**

Land development changes the hydrologic properties of a given watershed and generally increases the pollutant load transported by runoff compared to predevelopment conditions. The term stormwater quality volume (SWQV) is generally used to define the amount of stormwater from any given storm that should be captured and treated in order to remove a majority of stormwater pollutants on an average annual basis before it is transported to receiving waters. Since the majority of all rainfall typically occurs in relatively small events, managing the discharge of the SWQV is considered to be a cost-effective standard for minimizing overall pollutant discharge to receiving waters.

The goals of this task related to the post-construction stormwater quality design standards are to:

- 1) Improve the MS4 permittees understanding of the various post-construction stormwater quality design standards in the Middle Rio Grande watershed.
- 2) Review the intent of the Middle Rio Grande Watershed Based (MRG WSB) MS4 Permit, Permit No. NMR04A000, Dec. 19, 2019, and related reference documents associated with post-construction runoff values.
- 3) Consider the equity of the application of differing post-construction stormwater quality design standards within the watershed.
- 4) Assist the MS4 permittees in preparing for the next MRG WSB MS4 Permit related to post-construction requirements.

The intent of the Post-Construction Stormwater Management requirements in the MRG WSB MS4 Permit, according to EPA, are to:

- Prevent or reduce pollutants in stormwater discharges from reaching the Rio Grande;
- Mimic predevelopment hydrology; and
- Reduce impacts on natural channels and flow paths due to changes in hydrology.

The literature review for this task provided multiple explanations of the purpose of using percentile storms to define and simplify a stormwater quality design standard. The quotes shown below are examples that explain that creating a stormwater quality design standard that maintains on site the 90th percentile storm event (new development) and 80th percentile storm event

(redevelopment) reasonably mimics predevelopment hydrology and addresses watershed water quality concerns.

"This permit proposes a **simple stormwater quality design standard** to ensure the hydrology associated with new development and redevelopment sites mirror the predevelopment hydrology of the previously undeveloped site."

-- Fact Sheet and Supplemental Information for the NPDES General Permit for Municipal Separate Storm Sewer Systems in the Middle Rio Grande Watershed – December 2014

"...predevelopment condition in the regulated MS4 area of the watershed is defined as the **rainfall depth above which measurable runoff first occurs under natural conditions.**"

-- Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, NM, April 2014, Kosco, et. al.

"...the performance standard to capture the 90th percentile storm event...is a **reasonable surrogate for mimicking predevelopment hydrology** for this watershed. Managing stormwater to predevelopment runoff conditions **will reduce water quality impacts on the receiving water.**"

-- Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, NM, April 2014, Kosco, et. al.

The post-construction predevelopment hydrology requirements in the MRG WSB MS4 Permit are met by agencies by defining a stormwater quality design standard. Post-Construction Part I.D.5 b.(ii).(b) of the MRG MS4 Permit states: "Incorporate a stormwater quality design standard that manages on-site the 90th percentile storm event discharge volume associated with new development sites and 80th percentile storm event discharge volume associated with redevelopment sites, through stormwater controls that infiltrate, evapotranspire the discharge volume,..." In predeveloped conditions, the 90th percentile storm represents the rainfall when runoff would first occur.

The MRG MS4 permittees approach the stormwater quality design standard slightly differently. There are three main components that factor into the application of a stormwater quality design standard.

- 1) The rainfall depth values.
- 2) Use of the rainfall depth or a reduced runoff depth in the stormwater quality design standard.
- 3) Area of the site to which the rainfall (or runoff) depth is applied. Some stormwater quality design standards apply this only to the impervious areas, some to all disturbed area, and others to the entire site.

The Post-Construction Stormwater Quality Volume (SWQV) Comparison Tool was created as part of this task to assist the MRG MS4 permittees with comparing the stormwater quality design standards used within the MRG watershed related to post-construction stormwater management. The Post-Construction SWQV Comparison Tool literature review research and findings were shared with the Mid Rio Grande Stormwater Quality Team (MRGSQT) in a virtual meeting on October 20, 2020. Review and feedback on the information and each agency's specific stormwater quality design standard was requested. Bernalillo County provided feedback to BHI and AMAFCA regarding the meeting, SWQV Comparison Tool, and agency stormwater quality design standards.

Figure 1 below illustrates the rainfall and runoff depths that are generally agreed to in the MRG Watershed. Table 1 on Page 4 provides a summary of the MRG watershed rainfall depths and the runoff depths, if applicable, with additional details and related references available in the SWQV Comparison Tool. Currently, there is fairly consistent consensus in the watershed on the rainfall depth value and a lack of consensus on if the rainfall depth or reduced runoff depth should be used in a stormwater quality design standard.

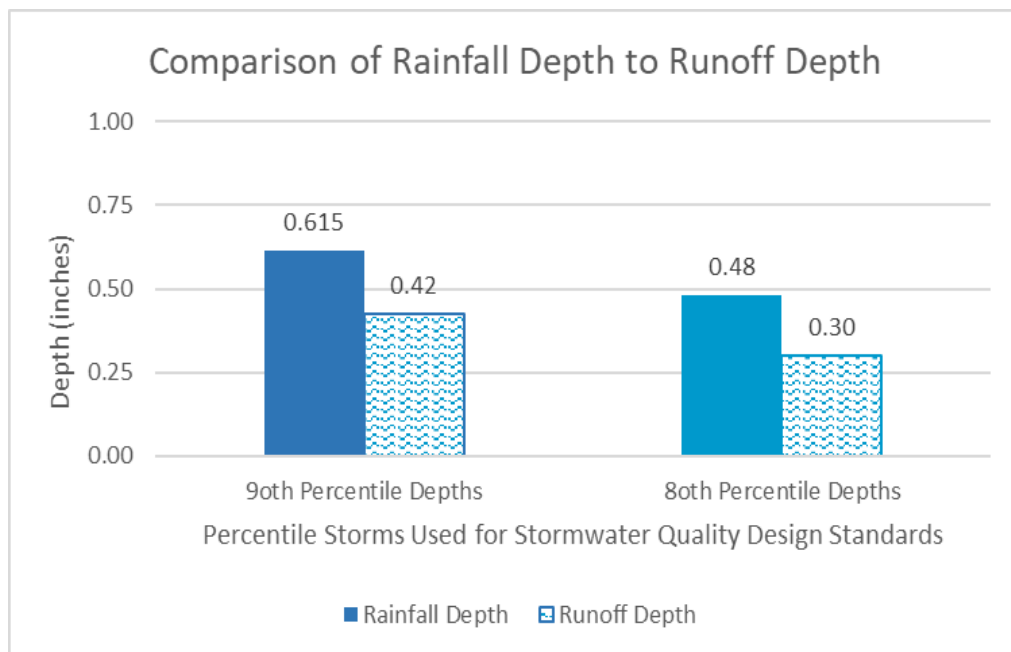


Figure 1: Comparison of Rainfall and Runoff Depths in the MRG Watershed

Table 1: Comparison of Rainfall Depths and Runoff Depths Used Within the MRG Watershed Related to Post-Construction Stormwater Management

Agency/Reference	New Development		Redevelopment	
	90th Percentile Storm Rainfall Depth	90th Percentile Storm Runoff Depth	80th Percentile Storm Rainfall Depth	80th Percentile Storm Runoff Depth
EPA, Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, NM, April 2014	0.615"	0.42"	Not stated - 0.48" directed by EPA (Nelly Smith - email included in Attachment to Memo)	Not stated - Calculated runoff value using TR-55, Rainfall depth = 0.48", CN of 98 (impervious) = 0.3"
EPA, Estimating Predevelopment Hydrology in New Mexico, 2015	0.65"	Not stated	0.48"	Not stated
City of Albuquerque, 2017 Memo (marked Draft) - Determination of 80th and 90th Percentile Storms for Stormwater Quality Volume	0.62"	0.42"	0.44"	0.26"
City of Albuquerque, DPM, June 8, 2020	0.62"	0.42"	0.48"	0.26"
Bernalillo County, Ordinance, Chapter 28, Article IV - Stormwater Quality	0.615"	County references 2014 predevelopment document	County references 2014 predevelopment document	County references 2014 predevelopment document
Bernalillo County, Technical Standards Document, currently being developed	0.615"	0.615"	0.48"	0.48"
SSCAFCA, DPM, Section 10, Stormwater Pollution Control	0.6"	0.46"	Not stated	Not stated
City of Rio Rancho, Ordinance, Chapter 153 - Erosion Control; Storm Drainage and Stormwater Quality	0.615"	CORR references 2014 predevelopment document	Not stated	Not stated
NMDOT, Drainage Design Manual, July 2018	0.615"	0.615"	0.48"	0.48"

The stormwater quality design standard is typically a SWQV calculation, which is a straightforward calculation:

$$\text{SWQV} = (R/12) * \text{Area} = \text{stormwater quality volume to be treated, in cubic feet}$$

R = 90th or 80th percentile event rainfall depth, in inches
Area = area of development or redevelopment, in square feet

To understand the magnitude of the impact of using the storm rainfall depth versus the reduced runoff depth in the stormwater quality design standard volume calculation, sample calculations were performed to demonstrate that use of the runoff depth leads to 69-percent lower volume requirements for the 90th percentile storm and 62-percent lower volume requirements for the 80th percentile storm. Figure 2 below illustrates this runoff volume reduction. The New Mexico Environment Department (NMED) Surface Water Quality Bureau shared that the use of the rainfall depth in the SWQV calculation was the intent of the language in the MRG WSB MS4 Permit (email documentation provided as an attachment to this memo).

The area used in the SWQV calculation also has an impact on the magnitude of water quality volume required. The SWQV calculation providing protection to the environment to the maximum extent practicable would apply the rainfall depth over the entire site. At the other end of the spectrum, the SWQV calculation providing protection to the environment to something less than the maximum extent practicable applies the reduced runoff depth to only the impervious areas of a given site. Using the impervious areas to calculate the SWQV is the current, standard practice in much of the MRG watershed. This current approach functions to encourage developers to include green stormwater infrastructure (GSI) and low impact development (LID) as well as increased landscape areas which would reduce the total impervious area of a site, thereby reducing the required SWQV. Compacted or disturbed areas may also be considered in the SWQV calculation if the agency reviewer has concerns about the stormwater quality runoff from these areas.

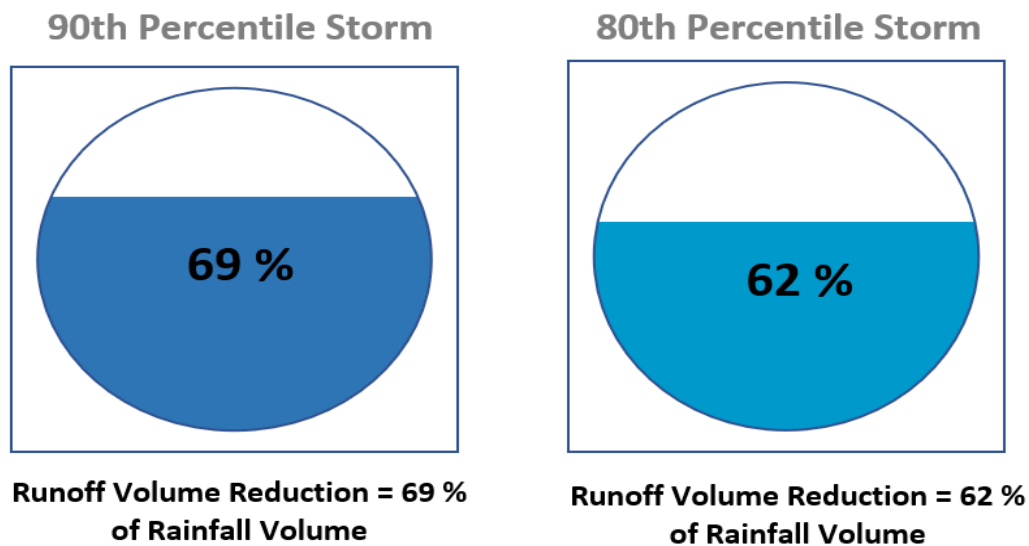


Figure 2: Comparison of Volumes if Using Rainfall and Runoff Depths Recommendations

Based on this literature review, research, and collaborative discussions, use of the rainfall depth in stormwater quality design standards is recommended for site development in the MRG watershed as the most protective standard for water quality. Rainfall depth is defined as 0.615” for the 90th percentile storm event for new development, and 0.48” for the 80th percentile storm event for redevelopment. Use of the runoff depth in stormwater quality design standards is used in the MRG, and it is a reduction in SWQV retention compared to use of the rainfall depth, although it does provide some water quality benefits. The MRG WSB MS4 Permit allows for alternative compliance for infeasibility to manage the SWQV on-site due to site constraints (as defined in the Permit), and some or all of the SWQV could be managed at downstream regional, public facilities that are designed for and have agreed to provide for water quality protection, as applicable for such projects. The intent of the MRG WSB MS4 Permit to prevent or reduce pollutants in stormwater discharges from reaching the Rio Grande and retention of the rainfall depth provides the most water quality protection.

The SWQV is recommended to be calculated for the impervious areas of a site. Compacted or disturbed areas may also be considered in the SWQV calculation. It is recommended that developers be encouraged to include green stormwater infrastructure (GSI) and low impact development (LID) as well as increased landscape areas to reduce the total impervious area of a site, thereby reducing the required SWQV. It is also recommended that water quality and detention inspections include a review of the original impervious area used in the SWQV calculation to ensure that site modifications have not increased the impervious area of a site. The extent of the application and/or adoption of these recommendations for post-construction stormwater quality design standards and inspections will be determined, and implemented by each MS4 permittee.

SJG/ab

Attachment 1 – Email Documentation Related to Rainfall Depth for MRG Watershed from EPA and NMED Surface Water Quality Bureau

**ATTACHMENT 1 –
EMAIL DOCUMENTATION RELATED TO RAINFALL
DEPTH FOR MRG WATERSHED FROM EPA AND
NMED SURFACE WATER QUALITY BUREAU**

From: Sarah Ganley [<mailto:sganley@bhinc.com>]
Sent: Wednesday, December 16, 2015 9:13 AM
To: Faidi, Hashem, NMDOT; Morgenstern, Steven, NMDOT
Cc: Barber, Ted L., NMDOT; Trujillo, Timothy R, NMDOT
Subject: FW: 80th & 90th percentile storm values for Albuquerque

Hello– based on Nelly’s responses – looks like the values to use for Middle Rio Grande MS4 – for post-construction requirements:

80th percentile storm = 0.48”

90th percentile storm = 0.615”

Thanks,

Sarah J. Ganley, PE
Engineer
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Direct line: 505-923-3314

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From: Smith, Nelly [<mailto:Smith.Nelly@epa.gov>]
Sent: Wednesday, December 16, 2015 9:09 AM
To: Sarah Ganley <sganley@bhinc.com>
Cc: Hashem Faidi (Hashem.Faidi@state.nm.us) <Hashem.Faidi@state.nm.us>; Steven Morgenstern (Steven.Morgenstern@state.nm.us) <Steven.Morgenstern@state.nm.us>; Tim Trujillo, PE (TimothyR.Trujillo@state.nm.us) <TimothyR.Trujillo@state.nm.us>; Barber, Ted L., NMDOT (Ted.Barber@state.nm.us) <Ted.Barber@state.nm.us>
Subject: RE: 80th & 90th percentile storm values for Albuquerque

Yes, Table 2-1 of the 2014 Report does not include the 80th percentile value. But Figure 2.6 can be used to extrapolate this value. It is less than 0.5” (as indicated in the Fact Sheet for the MRG MS4 Permit) - 0.48” can be used in the Albuquerque UA.

Thanks!

Nelly Smith
Municipal Stormwater Coordinator
EPA Region 6
Permits and Technical Assistance Section
NPDES Permits and TMDLs Branch

ph: 214-665-7109
Email: smith.nelly@epa.gov

From: Sarah Ganley [<mailto:sganley@bhinc.com>]
Sent: Wednesday, December 16, 2015 8:47 AM
To: Smith, Nelly
Cc: Hashem Faidi (Hashem.Faidi@state.nm.us); Steven Morgenstern (Steven.Morgenstern@state.nm.us); Tim Trujillo, PE (TimothyR.Trujillo@state.nm.us); Barber, Ted L., NMDOT (Ted.Barber@state.nm.us)
Subject: RE: 80th & 90th percentile storm values for Albuquerque

Thanks Nelly –

Based on this – the 90th percentile storm value for the Middle Rio Grande is 0.615”.

The ““*Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, New Mexico, EPA Publication Number 832-R-14-007*” does not have an 80th percentile storm value listed – which is a requirement for the post-construction standards. It only has an 85th, 90th and 95th. Is there a specific value you are using for the 80th percentile storm in Albuquerque?

Thanks,

Sarah

From: Smith, Nelly [<mailto:Smith.Nelly@epa.gov>]
Sent: Wednesday, December 16, 2015 7:36 AM
To: Sarah Ganley <sganley@bhinc.com>
Cc: Hashem Faidi (Hashem.Faidi@state.nm.us) <Hashem.Faidi@state.nm.us>; Steven Morgenstern (Steven.Morgenstern@state.nm.us) <Steven.Morgenstern@state.nm.us>; Tim Trujillo, PE (TimothyR.Trujillo@state.nm.us) <TimothyR.Trujillo@state.nm.us>; Barber, Ted L., NMDOT (Ted.Barber@state.nm.us) <Ted.Barber@state.nm.us>
Subject: RE: 80th & 90th percentile storm values for Albuquerque

For purpose of implementing the requirements of the MRG MS4 permit you should use the information in the ““*Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, New Mexico, EPA Publication Number 832-R-14-007*”. (p. 28 of Permit).

Both reports used different data set. The 2015 Report states on Pg. 8:

The previous predevelopment runoff study (Kosco, et. al., 2014) used data from the Albuquerque International Airport for the period 1950-2012. Because rainfall data for the other stations studied in this report did not extend back to 1950, this report used the most recent 30 year period of record (1983-2013) for all stations which resulted in a slightly higher 90th percentile event for Albuquerque.

- In terms of implementing the post construction standards in the Albuquerque UA, data should be used from the previous predevelopment runoff study (Kosco, et. al., 2014) or estimated through site specific pre-development hydrology and associated storm event discharge volume using the methodology specified in the 2014 USEPA Technical Report.

Thanks!

Nelly Smith

Municipal Stormwater Coordinator
EPA Region 6
Permits and Technical Assistance Section
NPDES Permits and TMDLs Branch

ph: 214-665-7109
Email: smith.nelly@epa.gov

From: Sarah Ganley [<mailto:sganley@bhinc.com>]
Sent: Wednesday, December 16, 2015 8:19 AM
To: Smith, Nelly
Cc: Hashem Faidi (Hashem.Faidi@state.nm.us); Steven Morgenstern (Steven.Morgenstern@state.nm.us); Tim Trujillo, PE (TimothyR.Trujillo@state.nm.us); Barber, Ted L., NMDOT (Ted.Barber@state.nm.us)
Subject: 80th & 90th percentile storm values for Albuquerque

Hi Nelly – In reviewing the two Pre-development hydrology papers for NM, I am unclear of the 80th & 90th percentile storm values for Albuquerque.

“Estimating Predevelopment Hydrology for Urbanized Areas in New Mexico”, Tetra Tech, March 2015 – has 0.48” for 80th and 0.65” for 90th

“Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed”, NM, Tetra Tech, April 2014 – does not have a 80th percentile storm event listed & the 90th percentile = 0.615”

The MRG MS4 Permit NMR04A000 specifically references this report: “Estimation of the 90th or 80th percentile storm event discharge volume is included in EPA Technical Report entitled *“Estimating Predevelopment Hydrology in the Middle Rio Grande Watershed, NewMexico, EPA Publication Number 832-R-14-007”*. (p. 28 of Permit).

I appreciate you help in clarifying these values for the Middle Rio Grande area.

Thanks,

Sarah J. Ganley, PE
Engineer
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From: Holcomb, Sarah, NMENV <sarah.holcomb@state.nm.us>

Sent: Friday, April 16, 2021 8:30 AM

To: Patrick Chavez <pchavez@amafca.org>; Kali Bronson <kbronson@bernco.gov>; Sarah Ganley <sganley@bhinc.com>

Cc: Dean, Levi, NMENV <Levi.Dean@state.nm.us>; Gatterman, David <dgatterman@sscafca.com>; Burrell, Monica <Burrell.Monica@epa.gov>; smith.nelly@epa.gov

Subject: RE: Stormwater quality volume calculation

Hi all,

Good morning! Yes, I do believe **the intent behind the calculation was to use the rainfall amount rather than the runoff amount**. Forgive me for not having the time to write an in-depth summary today, but obviously Monica and Nelly can provide you further feedback, if needed.

I hope you all have a great weekend - Be well and hopefully our paths will cross again in the future!

Sarah Holcomb

PSRS Program Manager

Office: **505-819-9734** ← NOTE NEW PHONE NUMBER

From: Patrick Chavez <pchavez@amafca.org>

Sent: Thursday, April 15, 2021 3:04 PM

To: Holcomb, Sarah, NMENV <sarah.holcomb@state.nm.us>; Kali Bronson <kbronson@bernco.gov>; Sarah Ganley <sganley@bhinc.com>

Cc: Dean, Levi, NMENV <Levi.Dean@state.nm.us>; Gatterman, David <dgatterman@sscafca.com>

Subject: [EXT] RE: Stormwater quality volume calculation

Hi Sarah:

Just a quick note to follow up on the below email discussion.

After communicating with a few TAG folks we thought it would be a good idea to at least try to memorialize in some fashion your "institutional knowledge" on the below issue of rainfall/runoff. I recall you sharing with most of this email group on a previous zoom call that you recalled the intent (protection to the greatest extent practicable) of the watershed based permit writers to be for MS4s to use rainfall and not runoff when calculating the required post construction storm water quality volume. Is that correct in terms of your understanding of the intent of the calculation?

Sorry to put you on the spot before you leave NMED for your awesome new job. It's just that you truly are one of a kind; and your insights relative to the intent of EPA's permit writer(s) are of great value to the watershed's MS4s.

Thanks again and take care,
Patrick

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Storm Water Quality Engineer
Albuquerque Metropolitan Arroyo Flood Control Authority
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