INTRODUCTION

Because storm water pollution is caused by so many different activities, traditional regulatory controls will only go so far. Education, source controls, and structural control requirements are key components to any successful storm water program. A successful program must also recognize that storm water quality, as a methodology, is constantly changing as technology and design continue to evolve. Thus, Best Management Practices (BMPs), designs and technologies that might be recommended or required today for addressing storm water pollution might may be shown to be obsolete in the future.

It is important to keep in mind that the small municipal separate storm sewer system operator (MS4) has a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements. This guidance manual strives to be flexible in allowing different combinations of structural and non-structural BMPs to address runoff from areas of new development/redevelopment, while ensuring that controls and or education is provided to address post-construction runoff concerns for each specific site.

HISTORY OF BEXAR COUNTY STORM WATER REGULATIONS

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) storm water program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a storm water management program as a means to control polluted discharges from these MS4s. The Storm Water Phase II Rule, which covers Bexar County, extends coverage of the NPDES storm water program to certain "small" MS4s but takes a slightly different approach to how the storm water management program is developed and implemented.

The State of Texas assumed the authority to administer the NPDES program in Texas on Sept. 14, 1998. NPDES is a federal regulatory program to control discharges of pollutants to surface waters of the United States. The Texas Commission on Environmental Quality (TCEQ) Texas Pollutant Discharge Elimination System (TPDES) program now has federal regulatory authority over discharges of pollutants to Texas surface water, with the exception of discharges associated with oil, gas, and geothermal exploration and development activities, which are regulated by the Railroad Commission of Texas. The following are historical milestones for Bexar County's TPDES Permit.

- EPA approved the TPDES Program in September, 1998.
- Phase II became final in December, 1999. All MS4's within urbanized areas with populations less than 100,000 must obtain a TPDES MS4 permit
- TPDES Phase II MS4 rules apply to 233 Texas small towns and rural areas, and state highway system roads within urbanized areas.
- June 2003, HB 2031 (78th Legislature) granted Bexar Co. the authority to implement a Storm Water Program. Federal challenges delayed Phase II Program Implementation and use of general permits nationwide.

- In July 2005, the District Attorney's Office determined that current authority granted by HB 2031 (78th Legislature) in 2003 was not sufficient to move forward and develop a funding mechanism to cover the program.
- June 2007, SB 1932 was passed allowing entities flexibility in developing a funding mechanism.
- On August 13, 2007, TCEQ finally approved a general permit allowing entities like Bexar County Phase II coverage.
- October 23, 2007 Commissioner Court approved the Bexar County's updated SWMP required by the General Permit.
- On September 2, 2008 Commissioner Court approved Bexar County's Federal Storm Water Fee schedule.
- 9 September 2008 Bexar County Commissioners Court Approved Bexar County Regulations for Storm Water Pollution Prevention
- On March 17, 2015 Bexar County Commissioner's Court approved the Phase II Final Rule measurable goal requirements for Bexar County as well as the creation of the Storm Water Management Program Guidance Manual.

The Phase II Final Rule requires an operator of a regulated small MS4 to develop, implement, and enforce a program to reduce pollutants in post-construction runoff to their MS4 from new development and redevelopment projects that result in the land disturbance of greater than or equal to 1 acre. This document is issued to help engineers, developers, and government officials understand what options are available to them when undertaking each type of project.

POST-CONSTRUCTION BEST MANAGEMENT PRACTICES (BMP'S)

A vital step in controlling the harmful effects of development on urban water-quality is managing post-construction storm water runoff. The primary method to control storm water discharges is the use of best management practices (BMPs). Measurable goals, which are required for the post-construction runoff control minimum measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect needs and characteristics of Bexar County and the area served by its MS4. Furthermore, the measurable goals should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure.

EPA has developed a Measurable Goals Guidance for Phase II MS4s that is designed to help Bexar County comply with the requirement to develop measurable goals. The guidance presents an approach for MS4 operators to develop measurable goals as part of their storm water management plan. The following section includes some non-structural and structural BMPs that could be used to satisfy the requirements of the post-construction runoff control minimum measure. It is important to recognize that many BMPs are site-specific and with Bexar County's vast array of soil types and ecoregions, not all BMP's will be equally effective in the Rio Grande Plain of southern Bexar County , the Blackland Prairie of Eastern Bexar County and the Edwards Plateau in the northern part of Bexar County. It should be noted that all areas of Bexar County that are located within either the Edwards Aquifer Recharge or Contributing Zones are required

by state law to follow the water quality design rules set forth by the TCEQ Edwards Aquifer Protection Program. All developments within the TCEQ's Edwards Aquifer Recharge or Contributing Zone jurisdictions are not required to implement additional mitigation measures due to the fact that the TCEQ's rules within both jurisdictions meet or exceed the goals set forth within the Phase II measurable goals. However, all developments within these two jurisdictions are still required to fill out and submit to Bexar County, the Bexar County Storm Water Quality Measures Calculation Sheet.

All projects that constitute new development or significant redevelopment in accordance with the Phase II final rule of development greater than or equal to 1 acre require Post-Construction BMP's. It should be noted that the Phase II Final Rule applies to "redevelopment" projects that alter the "footprint" of an existing site or building in such a way that there is a disturbance of equal to or greater than 1 acre of land. Redevelopment projects do not include such activities as exterior remodeling. Because redevelopment projects may have site constraints not found on new development sites, the Phase II Final Rule provides flexibility for implementing post-construction controls on redevelopment sites that consider these constraints. Post construction BMP's are to be in place to limit the quantity of harmful pollutants being discharged by the completed development during and following rain events.

Post-construction BMP's take different forms, structural and nonstructural. Examples of nonstructural would be public education, source controls, and low impact development. Structural controls would be storm water quality basins, detention ponds, vegetative practices, and floatable collection devices.

GENERALLY RECOGNIZED STRUCTURAL AND NON- STRUCTURAL BMP'S FOR NEW DEVELOPMENT/REDEVELOPMENT PROJECTS

The following represents generally recognized structural and nonstructural BMP's that are applicable to new development/redevelopment projects in Bexar County. A brief description of these BMP's is listed below. It should be reinforced that while the list of BMP's below does represent generally recognized BMP's it is not an all-inclusive list and BMP's not listed within this document, that still meet the minimum requirements as defined by the EPA are strongly encouraged. This guidance manual was created to help the end user fill out and submit the the Bexar County Storm Water Quality Measures Calculation Sheet correctly. The following BMP's and their designated point allocation will guide you through the process and will simplify as well as expedite the process. (See Appendices for BMP examples)

The calculation sheet is based off Target % impervious cover (IC), gross area of the project in acres (Ac.) and the proposed IC determined from your project design. The spreadsheet will then calculate your target mitigation points required. Once the mitigation value is established you may begin the input of BMP's into the spread sheet. The calculation sheet will add up your total mitigation points and will determine you if you have reached the target goal.

For more detailed information it is recommended to review EPA's website www.epa.gov, TCEQ's Edwards Aquifer Rules Technical Guidance on Best Management Practices (RG-348 current version) at www.tceq.state.tx.us, The San Antonio River Basin Low Impact Development Technical Guidance Manual at www.sara-tx.org, City of San Antonio (COSA) Storm Water Design Criteria Manual (current version) at www.sanantonio.gov. *Please see attached Appendices for BMP examples.*

NON-STRUCTURAL BMP's: (Please supply supporting documentation for all BMP's selected)

Unlike structural controls, or "end-of-pipe" BMPs, non-structural controls are intended to minimize or keep pollutants out of storm water through public education, design and or planning procedures, thus alleviating the need to try and remove them by structural means. Non-structural controls are by far the most cost-effective means to reducing storm water pollution. All storm water programs should have their primary emphasis on non-structural elements. The following are examples of non-structural BMPs that should be utilized for new development/redevelopment projects.

- PUBLIC EDUCATION/OUTREACH

Preventing pollutants from entering surface waters is preferable and more cost effective than treating the storm water after pollutants are co-mingled. One of the most cost effective BMP's that addresses this is public education/outreach. Educating future and existing homeowners, apartment tenants, employees, patrons as well as the general public of the direct link between property specific activities such as the application lawn fertilizers, pesticide use, non-collected pet waste and water quality in local surface waters is crucial to limiting the amount of pollutants directly entering local surface waters. Note: *Public Education/Outreach has a maximum point value of 2 points. No more that 50 percent of your total points can come from Public Education/Outreach BMP's if your total points required are greater than 4 points. BMP's from this category must be presented in a permanent format in places that can be viewed by homeowners, apartment tenants, employees, patrons as well as the general public in order to qualify*. (Provide documentation for County review)

- PLANNING PROCEDURES

Runoff problems can be addressed efficiently with sound planning procedures. Local master plans, comprehensive plans, and zoning ordinances can promote improved water quality in many ways, such as guiding the growth of a community away from sensitive areas to areas that can support it without compromising water quality. (Provide documentation for County review)

- PRESERVATION OF NATURALY OCCURING SITE-BASED BMPs.

These BMPs address "sensitive features" such as wetlands, floodplains, etc. and may include buffer strip land riparian zone preservation, minimization of disturbance and imperviousness, natural landscape preservation, tree preservation and maximization of open space. (Provide a Plan Exhibit and or other documentation for County review)

- SOURCE CONTROLS

Seemingly innocuous practices such as overloading or failing to close trash dumpsters, washing restaurant mats and equipment in parking lots, and leaving products/inventory

is open yards or storage facilities can generate harmful pollutants during rain events that will be transported into the storm sewer system. The only truly foolproof manner for preventing storm water pollution is to keep pollutants out of the storm water in the first place; therefore, source controls, such as good- housekeeping practices and no-exposure policies, are an essential component of a comprehensive storm water program. (Provide documentation for County review)

- INLET MARKERS OR SIGNS

A form of public education, permanent markers or stenciling at storm sewer inlets and manholes inform the public that storm sewers discharge directly to surface waters Without treatment. This BMP helps discourage homeowners and residents from dumping used motor oil and other household chemicals/wastes down storm sewer inlets. (Provide documentation for County review)

- LOW IMPACT DEVELOPMENT (LID)

Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature: manage rainfall at the source using uniformly distributed decentralized micro-scale controls. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that stormwater management should not be seen as stormwater disposal. Instead of conveying and managing / treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level. Low impact development is a broad term that covers a multitude of development practices that can reduce storm water pollution normally associated with development. These practices can include the reduction of impervious surfaces, elimination of curbs and gutters, substantial buffers around open storm water conveyances, urban forestry, and increasing the amount of open space by reducing lot sizes. Low impact development practices are known to have numerous environmental benefits, including pollutant reduction and removal. Trees and grasses can absorb water, pollutant gases, airborne particulates, sediment, nitrogen, phosphorous, and pesticides. Furthermore, by planting native species, the need for fertilizers and pesticides is substantially reduced.

There are numerous economic benefits to low impact development, including proven increases in property values. In addition, by preserving trees and forests, clearing and grading as well as erosion and sediment costs are saved during construction. Keeping areas natural as possible also minimizes maintenance costs. Many of the listed BMP’s within this document are considered LID methods and thus are highly encouraged. (Provide a Plan Exhibit and or other documentation for County review)

- URBAN FORESTRY

Urban forestry is the planting and study of trees in and around towns and cities. Since trees absorb water and filter particulate matter, patches of forest and trees that line streets can help provide some of the storm water management required in an urban setting. Urban forests also help break up a landscape of impervious cover, provide small but essential

green spaces, and line walkways and trails. (Provide a Plan Exhibit and or other documentation for County review)

- COMMERCIAL PROPERTY SITE DESIGN FOR POLLUTION MINIMIZATION

Inadvertent or passive exposure of machinery, products, and refuse to rainfall at commercial sites can be a source of storm water pollution. Covering delivery and fueling areas and sloping pavement in those areas away from the storm sewer inlets can prevent contaminated runoff. (Provide a Plan Exhibit and or other documentation for County review)

- STORMWATER QUANTITY REDUCTION

Stormwater quantity reduction can be achieved by mitigation of on-site storm water increase to pre-development conditions (15 points) or by payment or participation in a regional storm water detention program (5 Points). (Provide Plans and Calculations)

- PERMANENT BMP FEE-IN-LIEU

Fee-in-lieu of providing mitigation through the use of permanent BMP's by participating in a regional stormwater quality management program. The fee will be based on the project size (gross acreage) and the mitigation points required by the project. The use of the fee-in-lieu is limited to 50% of the total project mitigation points.

STRUCTURAL BMP's

Structural BMPs attempt to extract various pollutants out of storm water by various means. The primary pollutant removal mechanisms are based on sedimentation (e.g. pollutants binding to suspended sediments and dropping out during a quiescent period in a basin), biological uptake of pollutants by vegetation, and separation of pollutants from storm water by mechanical means.

Structural, unlike non-structural practices, can be costly and they require considerable operation and maintenance. Along with proper design and construction, maintenance of structural controls is critical. Failure to maintain controls properly can result in drastically reduced, or non-existent, pollutant removal. In fact, "non- maintained" structural controls can actually have negative consequences, such as producing a breeding ground for mosquitoes and other nuisances.

It should be noted that, as of the initial date of this policy document, no structural controls have been tested in Bexar County. While studies from other parts of the country detail various levels of pollutant removal for each type of structural control, their effectiveness in this area has not been verified.

- DRY/WET RETENTION AND DETENTION PONDS

Dry and wet extended detention ponds are basins whose outlets have been designed to detain the storm water runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. In wet ponds, biological uptake of pollutants by fringe vegetation is also possible. They provide flood control

by including additional flood detention storage, and can provide both flood and water quality protection (dual-use). Another method that provides both detention storage and stream bank protection (aquatic habitat protection) is to detain the 10% and 1% exceedance probability, 24-hour storm events (10 and 100 year storm events). (Provide plans and calculations for County review)

- CONSTRUCTED STORM WATER QUALITY WETLANDS

Existing wetlands have a unique ability to remove pollutants from storm water. By constructing engineered wetlands to address runoff from new development projects, some of the negative impacts can be mitigated. Constructed wetlands systems are believed to be quite effective but, at the same time, very maintenance intensive. Harvesting plants periodically, dredging silted areas, and providing a source of makeup water are all considerations; therefore, constructed wetlands should only be attempted if the proper operation and maintenance commitments and funding are in place. (Provide plans and calculations for County review)

- INFILTRATION BMP'S

Infiltration BMPs are designed to facilitate the percolation of runoff through the soil to ground water, and, thereby, result in reduced storm water runoff quantity and reduced mobilization of pollutants. Vegetative filter strips and grassy swales are recommended BMP's where land is available. By routing storm water through a vegetative BMP, pollutants either settle out in the low velocity flow, or are absorbed by and adsorbed to vegetation. Other examples include: infiltration basins/trenches, dry wells, permeable interlocking concrete pavement pervious concrete pavement and porous asphalt pavement

- FLOATABLE COLLECTION DEVICES

The accumulation of trash that is washed into our waterways causes a number of problems. Not only is it an aesthetic problem, but it also damages the aquatic habitat and is harmful to fish and other animal life. Small individual pieces of litter and trash find their way into local creeks and streams, which enter the major rivers and estuaries and eventually lead to our bays and ultimately the Gulf of Mexico. While the best method for addressing factitious floatables is through public education ("don't litter" campaigns, signage, inlet markers, etc.), it is believed that structural containment devices will be able to eliminate a certain percentage of floating trash and debris from storm water.

- HYDRODYNAMIC SEPARATORS/WATER QUALITY INLETS

Certain proprietary systems are available to address post-construction runoff. These systems mainly address oil and grease, as well as floating trash and debris. Their ability to remove suspended solids and associated pollutants is believed to be minimal. For highly impervious commercial sites where land is at a premium, these mechanical systems offer an alternative to land intensive basins and vegetative practices.

PROJECT EXAMPLES WITH ACCEPTABLE BMP'S FOR NEW DEVELOPMENT/REDEVELOPMENT PROJECTS (SINGLE FAMILY DEVELOPMENT, COMMERCIAL DEVELOPMENT, ROAD PROJECTS, FLOOD CONTROL PROJECTS)

This guidance manual is intended to provide information on what type of BMP's will be acceptable at plan review and permit time as well as provide assistance with completing the Bexar County Stormwater Quality Measures Calculation Sheet . As previously stated, these are not the only options available, and innovative storm water quality management plans and BMPs are encouraged. It is recognized that each property and project may have unique circumstances that will determine which BMPs are feasible for use. This policy document strives to be flexible in allowing different combinations of structural and non- structural BMPs, while ensuring that an acceptable minimum is provided to address post-construction runoff concerns. It is recognized that various local factors (detention/flood control criteria, soils, topography, right-of-way constraints, etc.) will impact the design of structural controls, and that it may not always be feasible to strictly comply with the design criteria set forth within the Bexar County *Storm Water Management Program Guidance Document, The following BMP types and project example types are included to further help guide the end user in a manner that will both ensure the calculation sheet is filled out correctly and expeditiously. All BMP's must meet the requirements set forth by the: TCEQ TPDES Rules, Stormwater Rules TCEQ's Edwards Aquifer Rules Technical Guidance on Best Management Practices (RG-348 current version), The San Antonio River Basin Low Impact Development Technical Guidance Manual (SARA), or City of San Antonio (COSA) Storm Water Design Criteria Manual (current version).*

TYPE PROJECT	EXAMPLES OF ACCEPTABLE BMP'S
Single Family Residential Development with Requirements for On-Site Detention	1) Dry or Wet dual-use (quantity/quality) basin(s) (Goal is removal of TSS) ***Structural BMP***
	2) Constructed wetland system design ***Structural BMP***
	3) Subdivision designed in accordance with Low Impact Development principles ***Non Structural BMP***
	4) Detention pond equipped to capture floatables to the 10-year storm and designed to detain the 10 and 100-year storm for stream bank/aquatic habitat protection (Goal is removal of TSS) ***Structural BMP***
	5) Inlet markers to deter dumping of motor oil and household hazardous waste into the storm sewer system. ***Non Structural BMP***
	6) Public education & Outreach (mailers, door hangers, signage, etc.) through the municipal utility

TYPE PROJECT	EXAMPLES OF ACCEPTABLE BMP'S
	district, new homeowner information packets or homeowners association, on the impact of fertilizers, pesticides, and animal waste on surface waters with guidance on ways to help.
	7) Preservation of Naturally Occurring BMPs-buffer strip,riparian zone preservation and tree preservationminimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
Single Family Residential Development without On-Site Detention Requirements	1) Dry or wet storm water quality basin(s) design ***Structural BMP***
	2) Constructed wetland system design ***Structural BMP***
	3) Subdivision designed in accordance with Low Impact Development principles ***Non Structural BMP***
	4) Floatables capture and collection method either in a basin, or in an area adjacent to the storm sewer system prior to outfall into Bexar County surface water. ***Structural BMP***
	5) Inlet markers to deter dumping of motor oil and household hazardous waste into the storm sewer system. ***Non Structural BMP***
	6) Public education & Outreach (mailers, door hangers, signage, etc.) through the municipal utility District, new homeowner information packets or homeowners association, on the impact of fertilizers, pesticides, and animal waste on our surface waters with guidance on ways to help.
	7) Site Based BMP's buffer strip, riparian zone preservation and tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
Commercial Development with On-Site Detention Requirements	1) Wet or dry dual-use (quantity/quality) basin(s) designed in general conformance with the Storm Water Quality Guidance Manual ***Structural BMP***
	2) Constructed wetland system designed in general conformance with the ***BMP***
	*3) Detention pond equipped to capture floatables to the 10-year storm and designed to detain the 10 and 100-year storm for stream bank/aquatic habitat protection.****Structural BMP***
	4) Commercial Property Good-Housekeeping Measures as part of project's Storm Water Quality Management Plan <u>or</u> design the project in accordance with Storm Water Pollution Minimization Practices ***Non Structural BMP***
	5) Proper Landscape Practices Commitment as part of the project's Storm Water Quality Management Plan. ***Non Structural BMP***
	6) Site Based BMPs buffer strip, riparian zone and tree preservation, minimization of disturbance and

TYPE PROJECT	EXAMPLES OF ACCEPTABLE BMP'S
	imperviousness, and maximization of open space. ***Non Structural BMP***
Commercial Development Without On- Site Detention Requirements	*1) Wet or dry storm water quality basin(s), grassy swale(s), or filter strip(s) or a properly sized structural control such as a hydrodynamic Separator or water quality inlet inserts.* ***Structural BMP***
	1) Constructed wetland system designed in general conformance with the ***Structural BMP***
	2) Commercial Development Good-Housekeeping Measures as part of the project's Storm Water Quality Management Plan or design the project in accordance with Storm Water Pollution Minimization Practices ***Structural BMP***
	3) Proper Landscape Practices Commitment as part of the project's Storm Water Quality Management Plan. ***Non Structural BMP***
	4) Site Based BMPs buffer strip,riparian zone and Tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
New Roadway / Roadway Extension Projects	If detention is required:
	1) Wet or dry dual-use (quantity/quality) basin(s) designed in accordance with the ***Structural BMP***
	2) Detention pond equipped to capture floatables to the 10-year storm and designed to detain the 10 and 100-year storm for stream bank/aquatic habitat protection. ***Structural BMP***
	3) Inlet markers to deter dumping of motor oil and household hazardous waste into the storm sewer system. ***Non Structural BMP***
	4) Urban Forestry Techniques ***Non Structural BMP***
	5) Low Impact Practices (decrease impervious surfaces, elimination of curbs and gutters, green space) ***Non Structural BMP***
	6) Site Based BMPs buffer strip, riparian zone and tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
	If detention is not required, any of the following may be acceptable
	1) Floatables capture and collection method either in a basin, or in an area adjacent to the storm sewer system prior to outfall into Bexar County surface water. ***Structural BMP***
	2) Urban Forestry Techniques ***Non Structural BMP***
	3) Inlet markers (on inlets draining to basin) to deter dumping of motor oil and household hazardous waste into the storm sewer system. ***Non Structural BMP***

TYPE PROJECT	EXAMPLES OF ACCEPTABLE BMP'S
	4) Signage to deter littering ***Non Structural BMP***
	5) Site Based BMPs buffer strip, riparian zone and tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
Flood Control Basin Projects or Channel Maintenance/Improvement Projects	If basin is proposed,
	1) Wet or dry dual-use (quantity/quality) basin(s) designed in general conformance with the ***BMP***
	2) Detention basin equipped to capture floatables to the 10-year storm and designed to detain the 10 and 100 year storm for stream bank/aquatic habitat protection ***Structural BMP***
	If detention is not required, any of the following may be acceptable
	1) Floatables capture and collection method either in a basin, or in an area adjacent to the storm sewer system prior to outfall into Bexar County surface water. ***Structural BMP***
	2) Urban Forestry Techniques ***Non Structural BMP***
	3) Inlet markers (on inlets draining to basin) to deter dumping of motor oil and household hazardous waste into the storm sewer system. ***Non Structural BMP***
	4) Signage to deter littering ***Non Structural BMP***
	5) Over bank erosion control features with a vegetative maintenance plan. ***Structural BMP***
	6) Site Based BMPs buffer strip,riparian zone and tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***
General Flood Control Project with no Detention Basins, Underground Utility Projects, Other	*1) Inlet markers or inlet stenciling to deter dumping of motor oil and household hazardous waste into the storm sewer system that drains into flood control facility and/or signage to deter littering* ***Non Structural BMP***
	2) Urban Forestry Techniques ***Non Structural BMP***
	3) Site Based BMPs buffer strip, riparian zone and tree preservation, minimization of disturbance and imperviousness, and maximization of open space. ***Non Structural BMP***

APPENDICES

A. Instructions for Completing the Bexar County Storm Water Management Program Calculation Sheet
B. Inlet Markers, Signs, Manhole Cover/ Examples
C. Public Education and Outreach Document Examples

Appendix A

Instructions for completing the Bexar County Storm Water Management Program Calculation Sheet

Base information

Project Name

Use a unique identifier name for the Project.

MDP/Plat #/Permit

Enter the appropriate identifier.

Are you required to submit a WPAP or CZP to TCEQ?

Answer "Y" for yes if the Project is located over the Edwards Aquifer Recharge Zone or over the Edwards Aquifer Contributing Zone. An answer of "yes" indicates that the Project is already providing water quality measures to meet the more rules set forth by the TCEQ. By answering "yes", the Applicant can skip the remainder of the calculation sheet.

All other Projects must answer "N" for no and continue filling out the calculation sheet.

Existing Project Information

Enter the total gross area of the Project in *acres*. The area should be defined as the legal boundary of the property the Project is situated.

Enter the gross area of existing impervious cover on the property in *square feet*. Impervious cover is defined as: roads, parking areas, buildings, pools, patios, sheds, driveways, sidewalks, and other impermeable construction covering the natural land surface.

Proposed Project Information

The target impervious cover percentages are set equal to the limitations of Category 2 properties as outlined the City of San Antonio Ordinance 81491 concerning development over the Edwards Recharge Zone. The targets represent a level of impervious cover that is acknowledged in the region for minimizing degradation to storm water quality. **These levels of impervious cover are not limits for the purpose of this calculation sheet and are only established as targets to establish a need for potential mitigation.**

Applicant shall enter the gross acreage of land use of the Project under the appropriate categories of single-family residential, multi-family residential, commercial/industrial, and transportation. If the Project has multiple land uses, then enter the appropriate acreages into the appropriate categories. The

entire acreage of the Project must be accounted and equal to the existing Project acreage entered in Section II.

Enter the gross area of proposed impervious cover on the property in *square feet* and by appropriate land use. The spreadsheet will calculate a composite impervious cover percentage of the Project.

The mitigation points are equal to the difference of the composite proposed impervious cover percentage from the composite target impervious cover percentage. If the existing impervious cover percentage is already greater than the composite target impervious, then the mitigation points are equal to the difference of the proposed composite impervious cover percentage from the existing impervious cover percentage. If in any case, the mitigation points are negative, then no mitigation is required and the Applicant can skip the reminder of the calculation worksheet.

Storm Water Quality Measures Provided – Non-Structural BMPs

Non Structural BMPs

Reduce Impervious Cover

Applicant shall attempt to minimize impervious cover on the Project. Some techniques the Applicant may consider include: narrower travel lanes, shared parking, curb extensions/bulb outs, clustering of buildings, multi-story buildings, and permeable pavement.

Applicant will not receive mitigation points for reducing impervious cover but will benefit by reducing the impervious cover percentage entered under Section III and the subsequent mitigation points.

Public Outreach

Applicant shall receive mitigation points for distributing or posting the Bexar County standardized public outreach flyer. When applicable, the flyer shall be included in closing or leasing documents. When applicable, the flyer shall be posted in common areas such as mail box kiosks, break rooms, etc.

Applicant shall receive 2 mitigation points for this BMP. There is no proration of mitigation points for partial compliance.

Inlet markers

Applicant shall receive mitigation points for storm drain marking. Storm drain marking involves labeling storm drain inlets with plaques, tiles, painted or pre-cast messages warning citizens not to dump pollutants into the drain. Common messages include "No Dumping" and "Drains to Waterways."

Applicant shall receive 3 mitigation points for implementing this BMP on all storm sewer inlets. There is no proration of mitigation points for partial compliance. Applicant may also receive the mitigation points for adding markers on an inlet immediately adjacent to and receives storm water from the Project.

Disconnecting Impervious Cover

Directly connected impervious cover, also known as effective impervious cover, has more influence on stream water quality than total impervious cover. Stormwater BMPs that disconnect impervious cover from stream channels and/or storm drain inlets improves water quality. Applicant will receive 1 point for every 1 percent reduction in directly connected impervious cover. Applicant must provide calculations and construction plans for the disconnected areas.

Disconnected Downspouts

Applicant shall receive mitigation points for ensuring that all runoff from rooftops is disconnected from impervious surfaces and/or storm sewers. For disconnection to be effective, downspouts must discharge into a suitable receiving area. Typical receiving areas for disconnected roof runoff include lawns, gardens, and other existing landscaping. Site constraints such as small or non-existent lawns may dictate that runoff is directed into a rain garden or an infiltration practice.

Applicant shall receive 5 mitigation points for this BMP. There is no proration of mitigation points for partial compliance. Additional mitigation points may be awarded under Section V if runoff is directed into a structural BMP such as grassing swales, vegetated filter strips, or bio retention.

Roadside Swales

Applicant shall receive mitigation points for ensuring that all roadways within the Project utilize roadside swales to convey runoff along roadways. If curbs are utilized, then the longest contributing impervious area flow path cannot exceed 75 feet before reaching a roadside swale. (i.e. a curb opening is to be provided at no more than 75' intervals)

Applicant shall receive 5 mitigation points for this BMP. There is no proration of mitigation points for partial compliance. Additional mitigation points may be awarded under Section V if runoff is directed into a structural BMP such as grassing swales, vegetated filter strips, or bio retention.

Other Options

Applicant may consider of non-structural BMPs but will need to contact the County and negotiate the merits and point value prior to submittal of the application.

Naturally Occurring Sensitive Features

Applicant shall receive mitigation points for preserving any existing naturally occurring sensitive features within the Project's boundaries. The applicable features are listed below.

Mitigation points are determined as 1 point per 2.5% preserved. The Applicant shall provide an exhibit depicting existing naturally occurring sensitive features with a calculation of the percentage of the total gross Project area that the features cover. A second calculation shall determine the percentage of the total sensitive feature area preserved.

Floodplain

Floodplain is defined as land within the Project subject to a one (1) percent (100-year) or greater chance of flooding in any given year along any channel, creek, stream, branch, or watercourse for surface water drainage that drains a watershed area greater than one hundred (100) acres.

Riparian Buffers

Riparian buffers are defined as vegetated areas adjacent to a naturally occurring floodplain that help to shade and partially protect a stream, creek or tributary from the impact of adjacent land uses. Riparian buffers are measured as a thirty-foot wide tree and understory preserve area parallel to the floodplain.

Wetlands

Land that: (A) has a predominance of hydric soil; (B) is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and (C) under normal circumstances does support a prevalence of that vegetation

Steep Slopes

Area of land with a slope exceeding fifteen (15) percent

High-Infiltrating Soils

Land on which the soils exhibit low runoff potential and high infiltration rates shall be preserved to the maximum extent practical. Soils are classified into hydrologic soil groups (HSG) by the Natural Resources Conservation Service (NRCS) on the basis of the soil's potential for runoff. Soil Group A describes soils that are sand, loamy sand, or sandy loam, which have low runoff potential and high infiltration rates even when thoroughly wetted. Limits of Type A soil on the Project can be determined by either NRCS maps or through soil borings on site.

Landscaping & Tree Preservation

Preservation of existing tree canopy

Applicant shall provide an exhibit of the Project depicting the Project overlaid onto a current aerial photo. The existing tree canopy to be preserved must be outlined with area calculations.

Mitigation points are awarded at 1 point per every 2% of existing tree canopy preserved.

Planting of new tree canopy

Applicant shall provide an exhibit of the Project depicting where new trees are to be planted along with species type and ultimate canopy area of each new tree. The ultimate tree canopy of each new tree shall be determined using the shade value (square feet) shown in the City of San Antonio Unified Development Code Appendix E: San Antonio Recommended Plant List.

Mitigation points are awarded at 1 point per every 4% of new ultimate tree canopy planted.

Storm Water Quantity Reduction

Applicant shall receive mitigation points for participating in a regional storm water management program. Participation in a regional storm water management program could include paying a fee in lieu of providing on-site detention or constructing downstream conveyance improvements.

This BMP is worth a maximum of 5 mitigation points and is computed by entering the percentage of the site that is covered by the regional program.

Storm Water Quality Measures Provided – Structural BMPs

Structural BMPs

Applicant shall receive mitigation points for providing structural water quality control measures. Examples of these measures include vegetated swales, vegetative filter strips, sand filters, bio retention, rain gardens, permeable pavement, green roofs, extended detention basins, constructed wetlands, rainwater harvesting, mechanical separators, etc. Applicant must design the structural BMPs to the standards of either TCEQ's *Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices* or SARA's *San Antonio River Basin Low Impact Development Technical Design Guidance Manual*.

Mitigation points are awarded at 1 point for every 2% of total suspended solids (TSS) removed by the structural BMP(s). Application must provide calculations and construction plans.

Storm Water Quantity Reduction

Flow Rates

Applicant shall receive mitigation points for maintaining post-construction storm water runoff flow rates to pre-construction storm water runoff flow rates. This is typically achieved through storing runoff in detention basins with outlets designed to release the impounded water over a determined amount of time. The flow rates from the Project must be mitigated to the 5, 25, and 100 year events and 24 hour duration.

This BMP is worth a maximum of 15 mitigation points and is computed by entering the percentage of the total area that is covered by the BMP. Applicant must provide calculations and construction plans.

Volume

Applicant shall receive mitigation points for retaining on-site a portion of post-construction runoff volume from leaving the site. This is typically achieved through rain water harvesting and infiltration type BMPs. Retained water must be utilized in landscaping or allowed to infiltrate, transpire, or evaporate. Qualifying BMPs must provide enough volume to capture 0.5 inches of runoff from its contributing watershed.

This BMP is worth a maximum of 15 mitigation points and is computed by entering the percentage of the total area that contributes to the BMP. Applicant must provide calculations and construction plans.

Participation in the Storm Water Quality Mitigation Fund

Participation Calculation

Applicant shall receive mitigation points for participating in a regional storm water quality program. This method of achieving the required mitigation is intended to be used when other options are not feasible or there is another hardship on the property. The maximum allowable mitigation obtained by payment into the regional storm water quality program is 50% of the required mitigation. This allowable maximum may be increased by special approval by the County if the applicant, through no action of their own, has a hardship that creates an inability to achieve mitigation by other methods.

The participation in the Storm Water Quality Mitigation Fund is calculated by multiplying the number of square feet of impervious cover above your target impervious cover by the set fee per square foot designated for your land use type.

Land Use	Fee Per SQFT Above Target Impervious Cover
Single Family Residential	$0.15
Multi Family Residential	$0.20
Commercial/ Industrial	$0.25
Transportation	$0.25

APPENDIX B

Examples of Inlet Markers, Signs and Drain Covers

Get Smart on Water Pollution at Home and How You Can Help!

What you do around your home—whether you're washing the car or maintaining the lawn, your car is leaking oil, or you're littering pet waste—doesn't affect just your property. Everyone in Bexar County lives within a watershed, and everyone contributes to the quality of the surface water resources. Rain drains from lawns and driveways into storm sewers connected to streams, creeks, storm ponds and lakes.

Your Driveway is in a Watershed.

Car wash soap and oily grit from driveways and street curbs are pollution that is unhealthy for fish and other aquatic animals in lakes and wetlands. To avoid being this kind of polluter, wash your car on grass or gravel that drains away from the street. Or, go to a car wash where the water is recycled and drains to the sanitary sewer for treatment.

Your Lawn is in a Watershed.

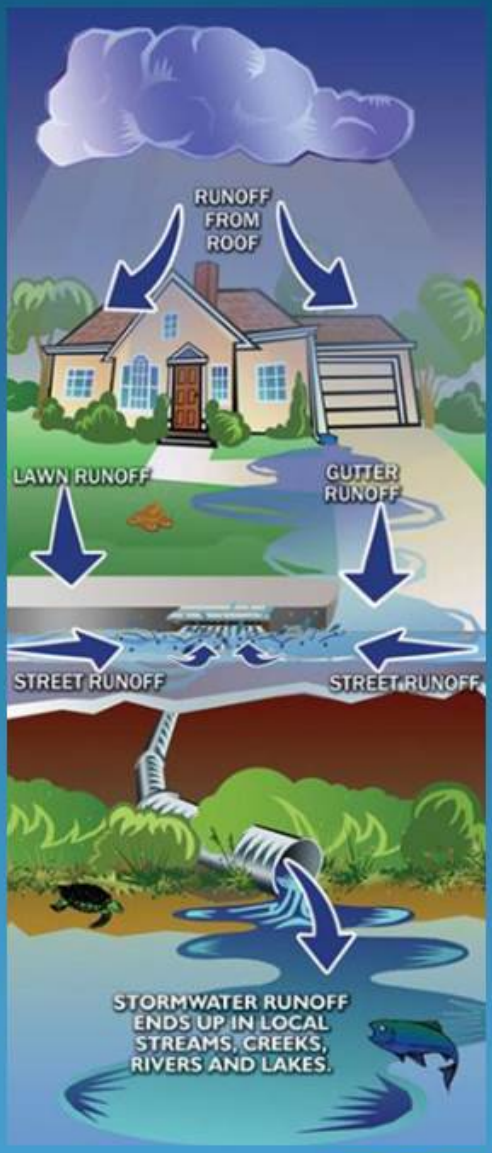
You fertilize, mow, and rake leaves to the driveway or street. Then it rains, washing fertilizer, grass clippings, and leaves to the storm water drainage system. Runoff containing phosphorus from fertilizer, grass, and leaves stimulates excess algae and contributes to low dissolved oxygen in local water bodies.

The Street is in a Watershed.

Leaking oil from cars drips onto driveways, parking lots, and streets. Storm water washes these surfaces into street drains. Imagine the number of cars and the amount of oil migrating from leaky gaskets into our surface waters. Fix oil leaks, for water quality sake!

Pet Waste is Litter in a Watershed.

When our pets leave waste on lawns or near street curbs, rain can wash it into street drains. Collect and properly dispose of pet waste (preferably in the toilet) where it will be treated as it should!



Let's Talk About Your Lawn and Storm Water Pollution

Irrigation
When watering the lawn during the hottest part of the day, you may lose 50% of irrigation water to evaporation. Also, small leaks may add up to hundreds or thousands of gallons of wasted water (and money). Inspect your watering system or hire a professional for an "irrigation audit."

.

Helpful Watering Tips

- 1" of water per week (via rain or irrigation) is adequate. Measure rain with an accurate gauge; measure irrigation with a small container (like a tuna can).
- Avoid watering between 11am-4pm to reduce loss by evaporation. It's better to water in the early morning or late evening.
- Avoid watering on windy days to reduce water loss.
- Avoid over-watering, which causes shallow roots, lawn disease, and stress. Check the soil moisture before watering, with a simple moisture meter.

Lawn Soils
Tight soils limit deep root growth, prevent water from soaking into the ground, and make lawns susceptible to drought stress. To determine if a lawn needs aeration, push a wire stake flag into the ground when moist but not soaked or parched. If you can push in 12" or more, you don't have a compaction problem.

A "core-plug aerator" effectively loosens compacted lawn soils. You can rent a self-propelled unit or hire a lawn service company. Late Fall and early Spring are the best times for this work. Important: Locate buried wires and irrigation heads beforehand. During aeration, top-dress your lawn with 1/4" of well-aged and weed-seed-free compost. This builds healthy soils by adding organic matter.

Mowing
Grass roots grow deeper when your lawn is mowed about 3" than about 1". Deep roots help increase drought tolerance and decrease soil compaction. Such lawns also help restrict dandelion and other weed growth. Use a sharp mulching blade for a healthy lawn. Mulched grass clippings are free, recycled fertilizer and are also good for soil-moisture retention

Lawn Alternatives
Consider other types of lawns that need less mowing and watering and that may work better with your soil conditions. Fine-fescue lawns have deeper roots (up to 9") than typical lawns (1-3"). Fescue lawns' dense growth crowds out weeds, and because their growth is short, you can mow less often. Seeding is best done in the fall when cool temperatures and rains support quick germination with little weed competition. You can overseed into an existing lawn or start from scratch. Fescues do very well in sunny or shady areas but not where there's heavy foot traffic and compacted soils.